FOOD MANUFACTURE

Incorporating Food Industries Weekly

EONARD HILL LIMITED, 17, STRATFORD PLACE, LONDON, W.1 AUGUST 1, 1945

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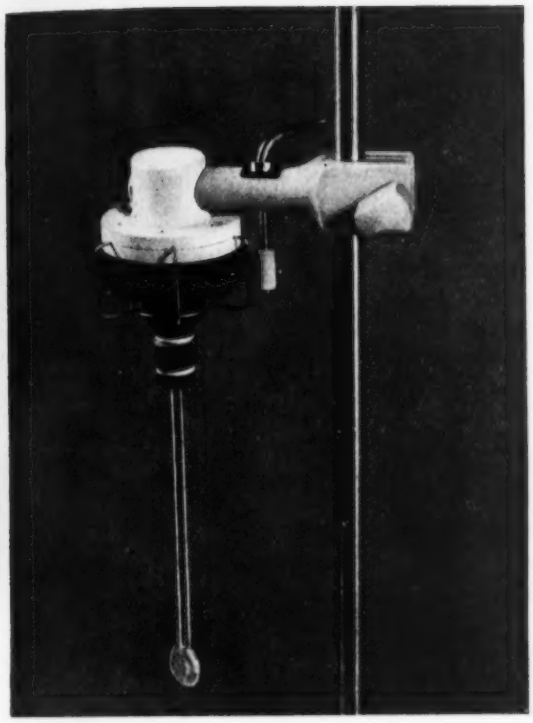


THE T & M "TURBINIA"

"It purrs as it stirs"

COMPLETELY FUME AND FLAME PROOF

SPEED RANGE 0—5,000 r.p.m.

DOUBLE BALL BEARING ROTOR

FITS NORMAL ¼" RETORT STAND

INSTANTLY REPLACEABLE GLASS STIRRERS

CONSUMPTION ONLY
1 cu. ft. free air per minute at 25 lbs. sq. in. pressure.

Gives a greater low speed torque and better speed range than electric stirrers.

CAN BE ADAPTED FOR THE SAME SPEEDS WITH HIGHER OR LOWER PRESSURES

The construction is shown very well by the illustration. The Rotor consists of eight cups set at the most efficient angle on to which a jet of air impinges. Both ball races are housed in the rotor, the silver steel shaft being stationary and fixed by set screw in the stator. With this arrangement the lower bearing is close up to the stirrer and the rotor and stirrer run true and give an extremely rigid assembly. The bearings are completely protected from fumes. The lower one is running in an oil bath and the upper one is behind an annular sleeve running up into the stator with small clearances. This contains a chamois leather gland on to which the oilway discharges. An oil hole with stopper is provided and an occasional drop of thin oil is required. If too much oil is used it is flung out and does not run down the stirrer.

THE ROTOR AND CHUCK of our new rubber clamped quick-acting type are machined out of one solid piece of Catalin and are proof against ordinary laboratory fumes and acids.

To insert a new stirrer the bevelled end of the rod is merely inserted in the bottom of the chuck and pushed home, when it is firmly held between parallel jaws which locate it exactly. It can be removed equally easily but cannot fall out even with vibration.

THE AIR TURBINE IS EXTREMELY FLEXIBLE AND CAN BE READILY ADJUSTED BY AN ORDINARY COMPRESSED AIR NEEDLE VALVE DOWN TO A TICKOVER. AS THIS IS AN "IMPULSE" TURBINE IT DOES NOT RELY ON HIGH SPEED FOR ITS TORQUE.

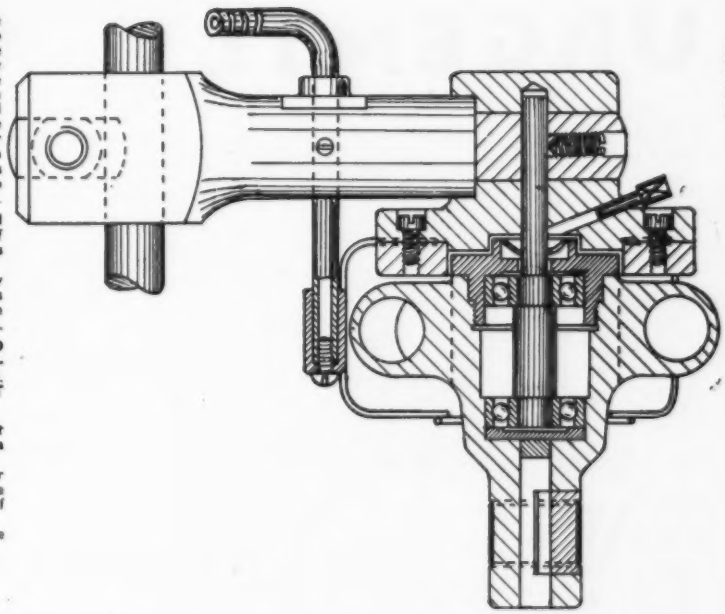
Note the all Plastic clamp and holder which support the turbine and fix it to any normal retort stand using a ¼ in. rod.

The instrument will work off any normal compressed air supply by using various sizes of jet, the lower the pressure the bigger the jet required and the greater the consumption of compressed air.

At 10 lbs./sq. in. about 3 cu. ft./min. are required to give the same results as with 25 lbs./sq. in. and 1 cu. ft./min.

Supplied complete with 2 Stirrers.

S.53 Price ... ... **£4 12s. 0d.** each.



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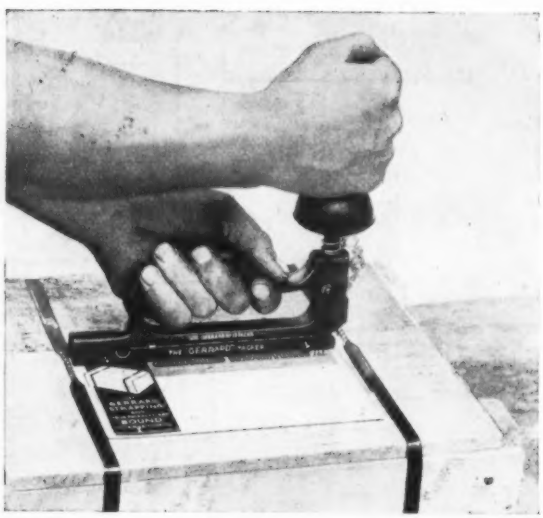

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STAINLESS STEEL

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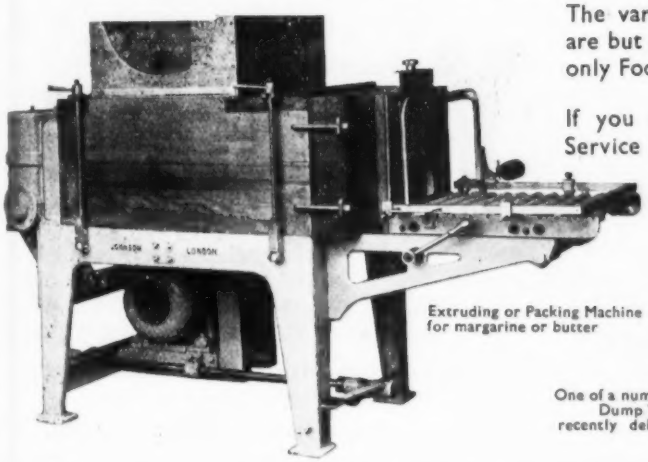
If you are engaged on essential work our Technical Service is at your disposal at all times.



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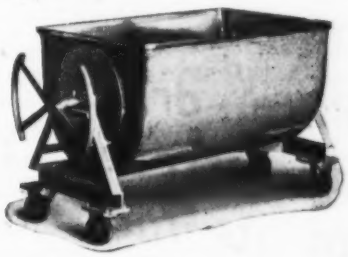

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Coffee Percolators: part of an order for a well-known firm

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In 1910 swift expansion called for the building of larger premises in King Edward Street, Liverpool, and later for the installation of a large department for lithography. In 1922 an additional factory was erected at Court Hey, specially designed and equipped for the manufacture of folding boxes and cartons on a large scale.

To-day, P. P. Press activities cover every kind of colour printing by all processes—letterpress, litho, photo-gravure—with special capabilities in handling work which requires delicate and difficult reproduction and fidelity.

AND NOW—Together under the name of Brown & Bibby Ltd. it is intended to carry on the traditions of fine workmanship and good service so firmly established by the two Companies—with grateful thanks to all who by their custom have made this step possible and in the confident hope that the many happy relationships of the past may be continued in a wider and happier future.

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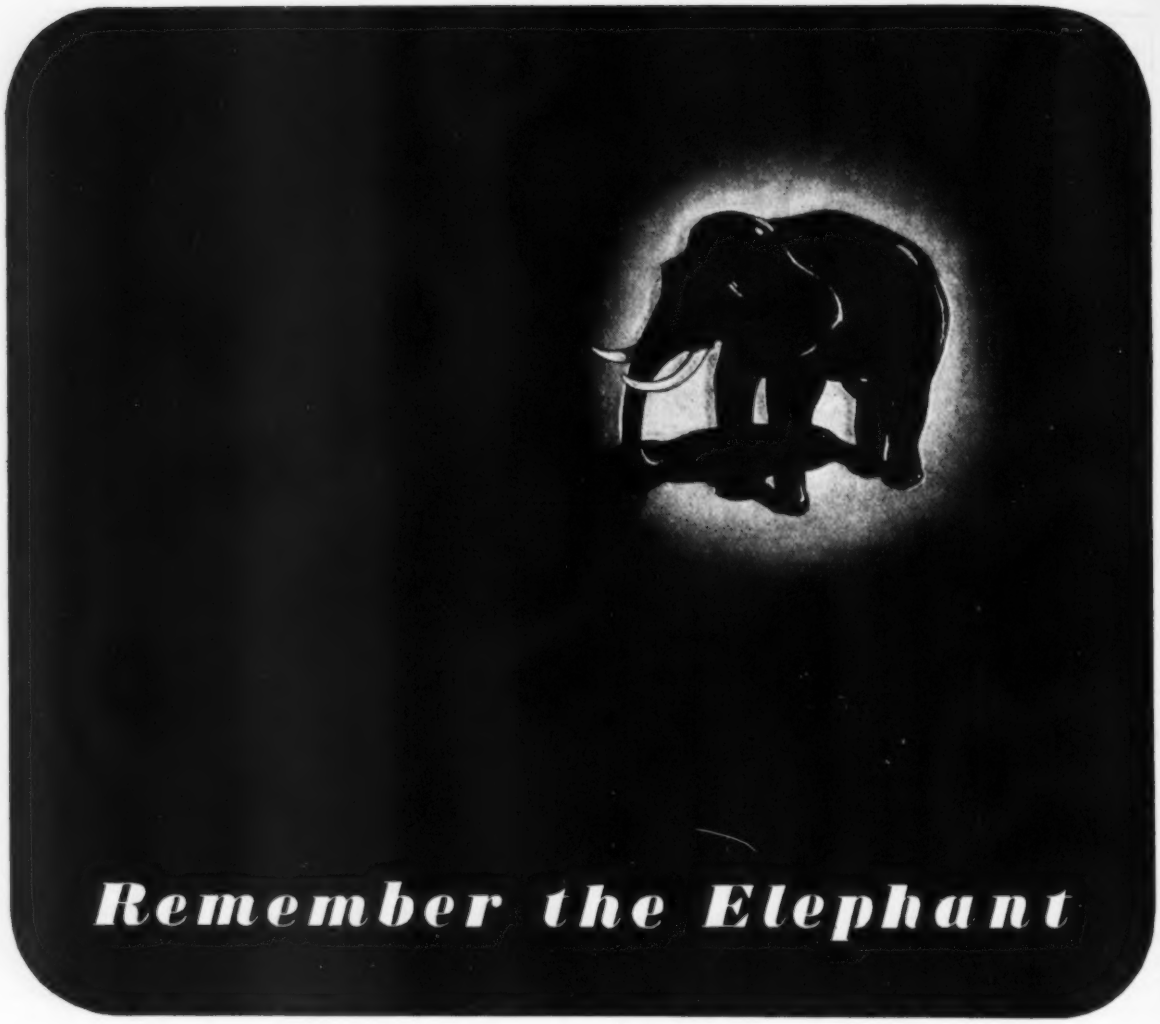

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EGG SUBSTITUTE POWDER (contains no Eggs)

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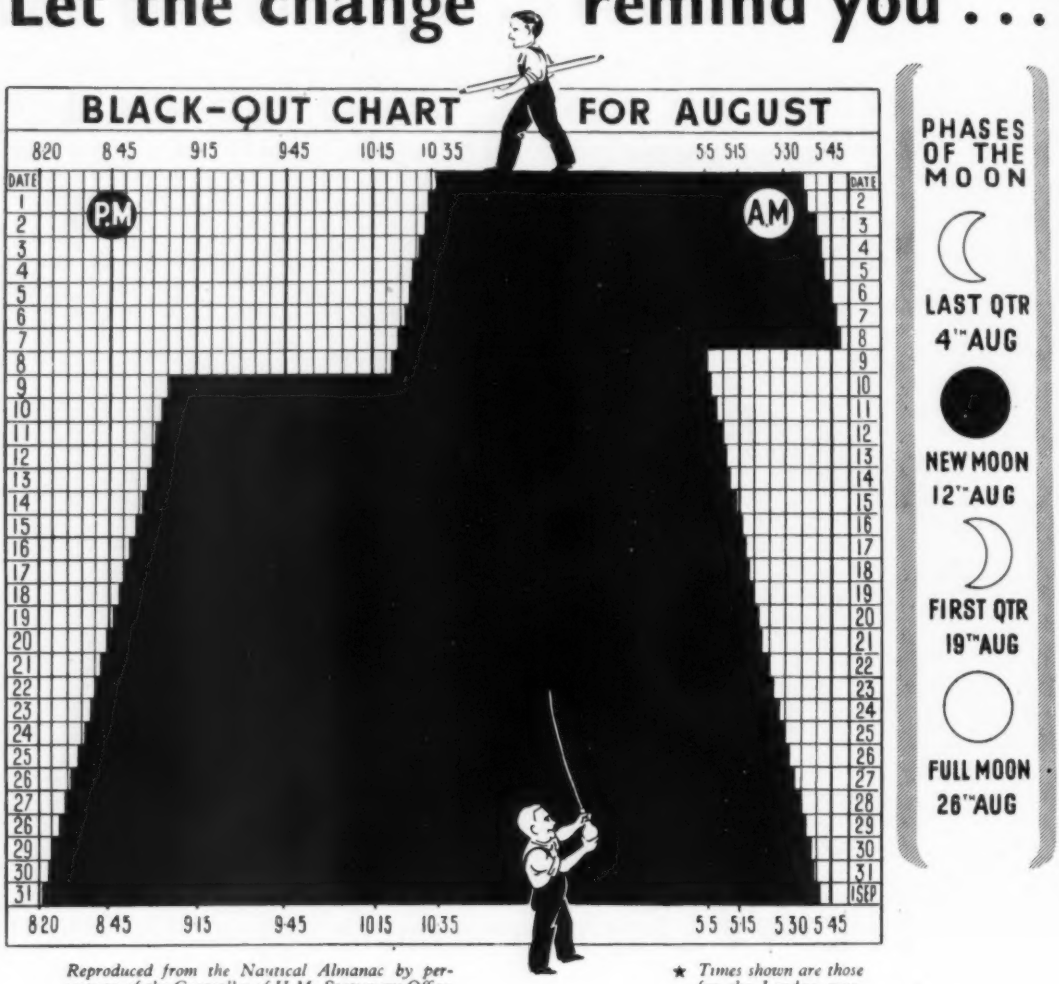
BLACK-OUT CHART FOR AUGUST
8 20 8 45 9 15 9 45 10 15 10 35
5 5 5 15 5 30 5 45
DATE
P.M
A.M
PHASES OF THE MOON
LAST QTR 4TH AUG
NEW MOON 12TH AUG
FIRST QTR 19TH AUG
FULL MOON 26TH AUG

Reproduced from the Nautical Almanac by permission of the Controller of H.M. Stationery Office.

★ *Times shown are those for the London area.*

In August, the extra hour of daylight is lost to the industrial war effort, and besides, black-out hours increase alarmingly with the shortening days. Preparations are being made for winter—lighting schemes adjusted to assist a still greater output, and Osram will continue to be the choice of all who demand of their lamps really dependable service under all conditions.

Osram

A G.E.C. PRODUCT

THE WONDERFUL LAMP

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

CASE DISMISSED! *"The defendants, Seal-Less Strapping Limited, are accused of spreading reports that heavy closed crates and cases are often quite unnecessary; that such crates and cases certainly provide bulk and weight but by no means necessarily strength and security. The defendants point out that Beer Bottles — I must admit that I have seen them myself (LOUD LAUGHTER) — have for years been transported safely in open crates. They claim that if it is well designed and reinforced with Seal-Less High-Tensile Steel Strapping, the lightest pack is often the safest; and that visibility of contents, far from adding to danger is an added* ***safeguard*** *against breakage and theft. In my view the defendants have amply proved their case. The evidence shows that an immense variety of goods, light and heavy can be safely dispatched on the longest journeys, even for Export, without the heavy wooden walls that we can now ill afford. The case (or crate) is dismissed. Exhibit A, Beer Bottles in crate will remain in custody of the court." (LOUD CHEERS)*

SEAL-LESS STRAPPING LTD., 19 SOUTHWARK STREET, LONDON, S.E.1. TELEPHONE: HOP 1661-2

CRG 7

DOUBLE SEAMING

Friction Rings being attached to 1 Quart Paint Cans.
Output—150 per minute, on our No. 51 Ten-Spindle
Automatic Rotary Seamer.

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CAN MACHINERY CO.
240 North Ashland Avenue
Chicago U.S.A.

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as gold everything which glitters as gold, neither should the appearance of a thing prejudice you as to its efficiency. Good, solid, sound construction is the basis of satisfactory performance, a factor indubitably found in the Kitchen Equipment of Still.

If you want the best

TEA AND COFFEE MAKING APPARATUS ● CANTEEN BOILER ● SILVER BURNISHING MACHINE ● DISH WASHING MACHINE ● HOT CLOSET AND CARVING TABLE ● POTATO PEELER ● BREAD SLICER ● TEA MEASURING MACHINE ● "METROPOLE" TOASTER AND GRILLER ● STEAM COOKER ● AUTOMATIC GLASS RINSER ●

B.W.8/42/c.

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Do not allow black-out temperatures to slow down your output. Consult the G.E.C., whose ventilation engineers will give expert advice on ventilation equipment especially designed for black-out conditions.

VENTILATION by GENALEX FANS

CONSULT THE G.E.C. ON VENTILATION with GENALEX EXHAUST FANS

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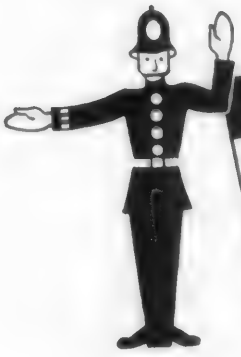

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BY

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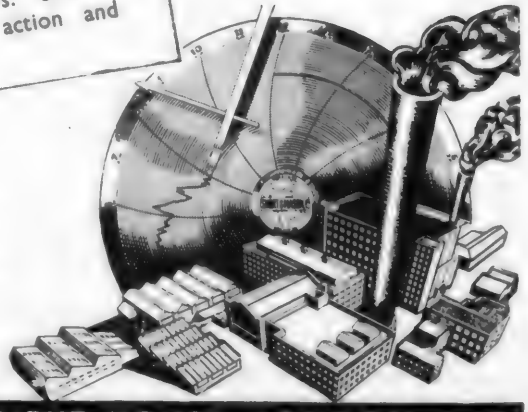

Manufacturers whose operations call for continuous accuracy of Record, Indication or Control, whether of Pressure, Temperature, Time, Humidity, Level or Flow, or combinations of any or all of them, are invited to consult Short & Mason's Engineers. No obligation is entailed in a preliminary survey.

SHORT & MASON LTD, THE INSTRUMENT HOUSE, LONDON E.17

A name to conjure with

One has to be something of a magician these days to meet all the varying demands on an organisation already hard pressed by the requirements of the national effort.

Still, though we cannot produce Glucose out of the proverbial "top-hat," we are doing all in our power to retain the good-will built up over many years by persistent research, efficient manufacturing technique and good service.

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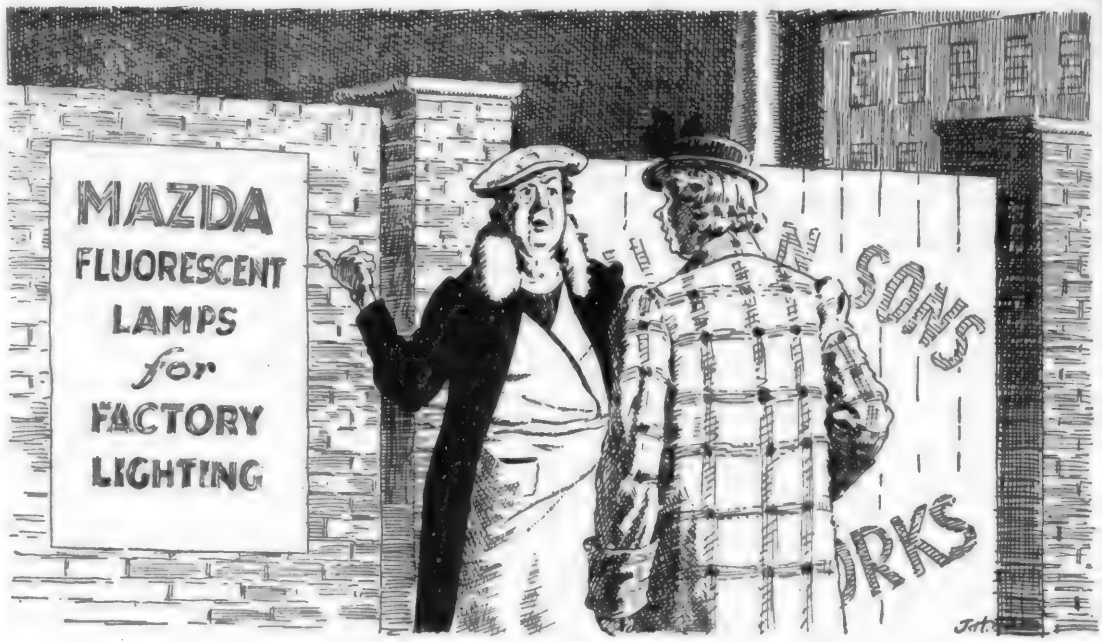

"TWO BLESSED HOURS I BEEN WAITING FOR 'IM! SINCE THEY PUT THESE 'ERE MAZDA FLUORESCENT LAMPS IN, 'E DON'T EVER WANT TO KNOCK OFF!"

Workers will if necessary stay on the job as long as they can see easily and without fatigue. B T H Light-Conditioning provides, for any given industry, exactly the kind of lighting under which maximum production can be maintained throughout the longest working hours.

Let B T H Lighting Engineers help you to plan efficient lighting for production and welfare.

MAZDA Lamps
with MAZDALUX Equipment

M 3951

B T H for all Electrical Plant and Equipment

THE BRITISH THOMSON-HOUSTON CO., LTD., CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

Steam trapping and saving fuel

IN YOUR EFFORTS to cut down fuel consumption have you checked on the way condensate is removed from your steam-heated equipment? There are substantial savings to be made in this direction.

Hand-operated drain cocks and cracked valves, because they were wasteful of steam, have largely been replaced by automatically self-adjusting valves, known as "steam traps." Their function is to discharge condensate without losing any live steam.

Steam trapping, properly applied, is one of the largest single sources of fuel economy. Badly applied it can be as wasteful of fuel as hand-operated cocks or cracked valves.

Why is this?

First, there is the question of steam trap type. There is no one type which is suitable for every draining job. On some applications, condensate must be discharged as soon as ever it forms : on others, good use can be made of the heat in the condensate before the water is discharged. Between the right and wrong type of steam trap there can be a difference of 12 per cent. in the steam consumption.

Then there is the question of trap size. If they are chosen merely on size of pipe connections (much in the same way as you might buy a hat or a pair of shoes) there is trouble ahead. A trap which is too big can be wasteful of steam : one which is too small can hold up production. The correct size saves steam and speeds production.

Next is the question of location. The simple truth might be that the best place for a steam trap is where condensate can most easily collect. But there are many considerations which decide the best position for a steam trap. And they have an important bearing on the efficient use of fuel.

EXPERT ADVICE

So you will see that whilst proper attention to condensate drainage will save coal (often in a quite astonishing fashion), there is yet a right way and a wrong way of going about it.

The Ministry of Fuel and Power is ready to assist in this and in other directions so that you may get the best results possible from your fuel supply. Please make use of the enquiry form.

Placed at the disposal of the Ministry of Fuel and Power by Spirax Manufacturing Co., Ltd., Cheltenham, Glos., as a contribution to the national campaign for greater fuel economy.

To the MINISTRY OF FUEL AND POWER,
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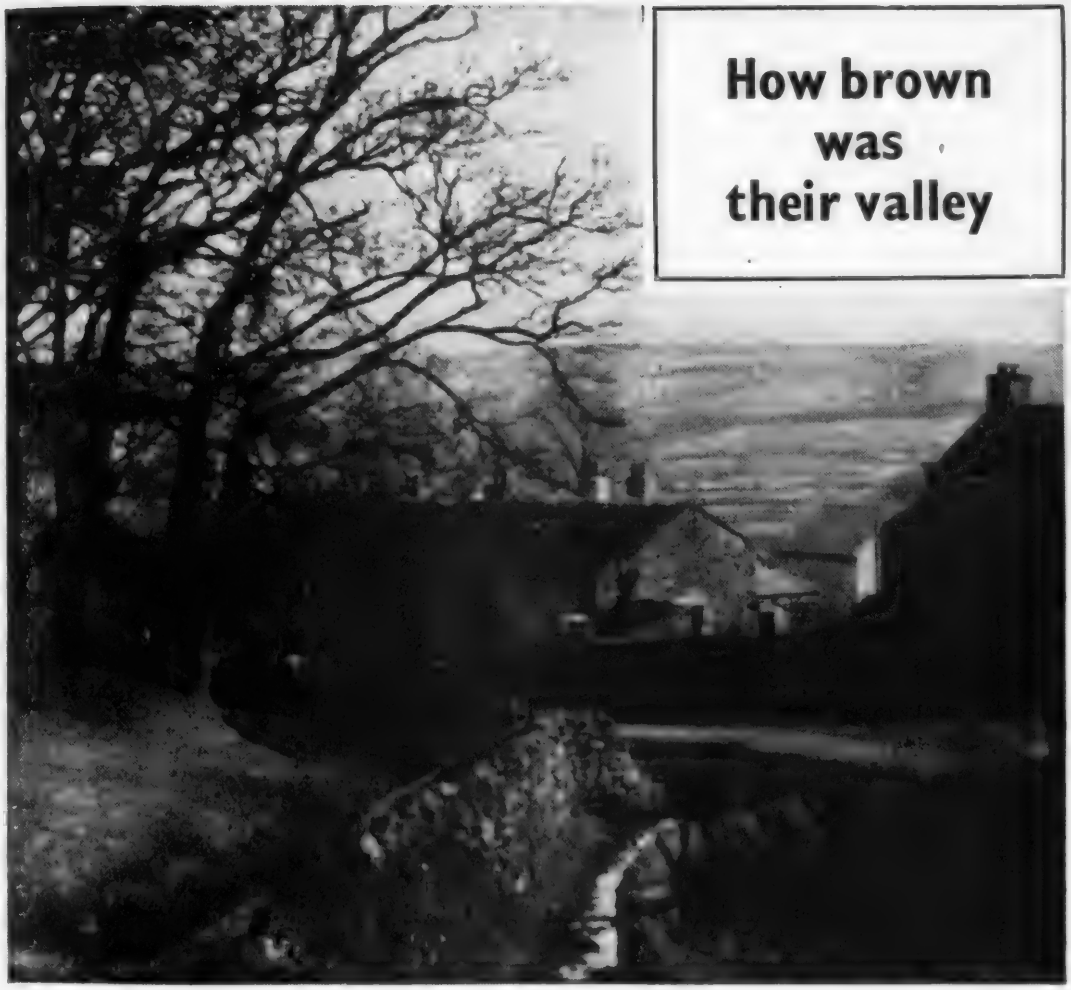

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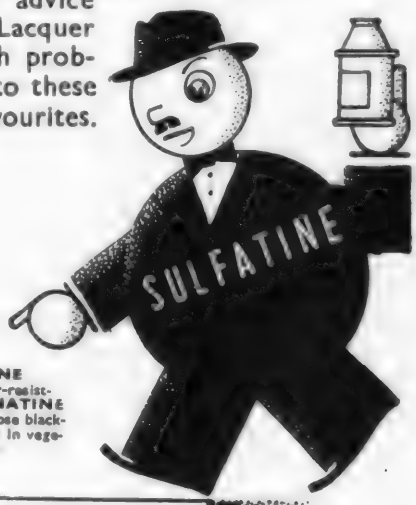

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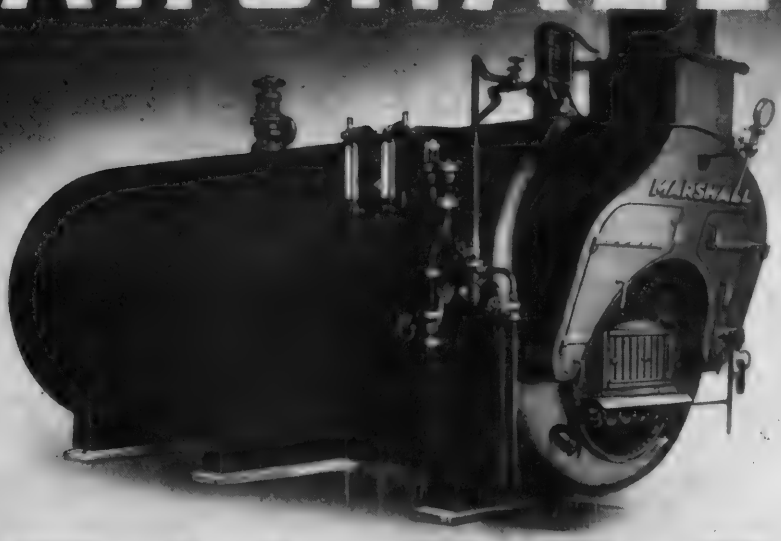

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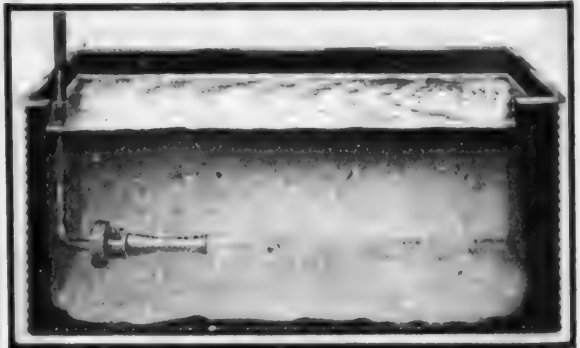

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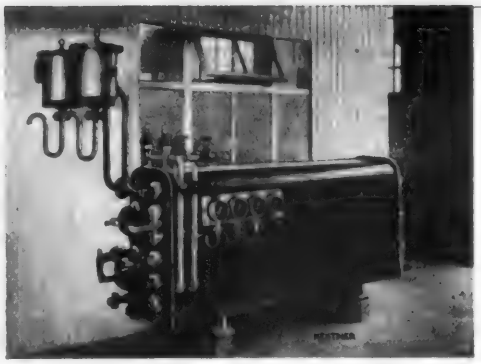

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FOOD MANUFACTURE

Vol. XVII. No. 8 · Published Monthly · August, 1942

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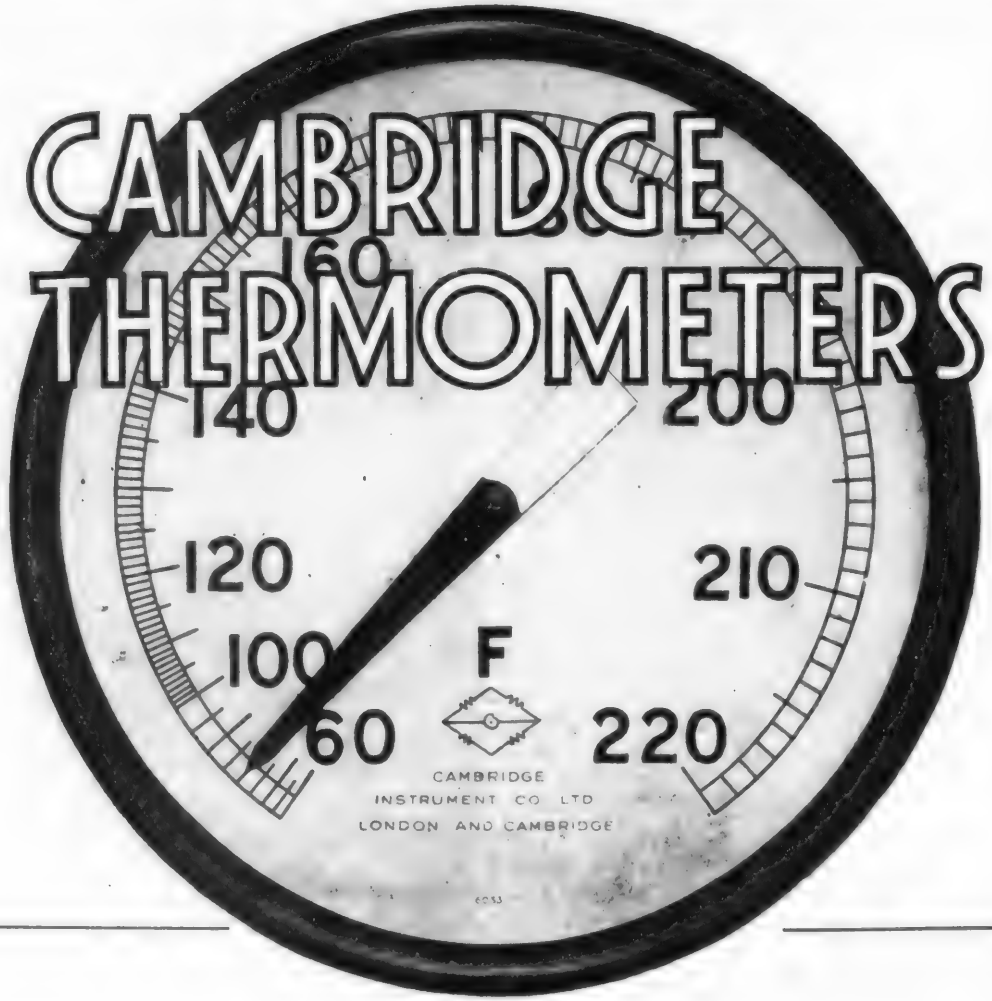

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FOOD MANUFACTURE

Vol. XVII, No. 8 August 1, 1942

Nutritive Value of Cauliflower

THE note on the mineral composition of Roscoff broccoli, which appeared recently in FOOD MANUFACTURE, emphasised the richness of this vegetable. The workers at Seale-Hayne College, who were responsible for the analyses, suggested that dried broccoli "curds" were of very similar composition to dried milk, except that fat was replaced by fibre. A paper by Margaret L. Fincke in the *Journal of Nutrition* (Vol. 22, 1941, pp. 477-482) has reported an investigation of the availability to rats of the calcium in broccoli and cauliflower and thus forms one of the very few contributions to our understanding of the nutritional value of these excellent vegetables. Dr. Fincke compared a wheat and milk diet with diets in which half the calcium of the milk was replaced by calcium from cauliflower or broccoli. At sixty days of age the animals had utilised 87 per cent. of the calcium of the milk, 79 per cent. of the calcium of milk plus broccoli, and 69 per cent. of that of milk plus cauliflower. The inferior utilisation of the vegetable-calcium may perhaps be accounted for by the presence of some of it as oxalate and by a diluting effect of the fibre. Oxalic acid amounted to 0·38 per cent. in the dried broccoli and 0·24 per cent. in the dried cauliflower.

Dried Eggs

The introduction of dried eggs into this country has been received with a considerable amount of satisfaction, but there is nothing very novel about the idea, according to a broadcast talk by Mr. C. D. Wilbur, of Armour and Co., U.S.A. The practice was started in China centuries ago, and the early Chinese method was simplicity itself. They just broke the egg and exposed its liquid content to the sun and air. In due course, the moisture evaporated.

The modern method consists of spray-drying, which has been found entirely satisfactory for whole eggs and for yolks, but does not work when applied to albumen by itself. However, a satisfactory process for drying this has been developed.

Egg drying was a growing business even before the war because it had real economic value. Dried eggs are not new in the U.S.A. (Mr. Wilbur continued), but until very recently a considerable portion of the product on the market was imported. There were probably fewer than 15 driers in the country, although these turned out about 15 million pounds of dried eggs during the season when these were available for drying purposes. Government officials have extended every possible aid in making new drying machinery available, and there are probably 87 driers now where only 15 operated a year ago.

Thermophilic Contamination of Cereals

In view of the greater proportion of cereals contained in certain wartime meat packs in this country, a paper read by J. Yesair and E. J. Cameron at the Thirty-Fifth Annual Convention of the National Canners Association will be of interest.

An investigation was carried out on a representative collection of samples to obtain some idea as to the distribution of thermophilic contamination and also, where low results were found, to determine by repeat samples whether low counts were characteristic of the samples.

The principal products examined were cornflour and wheat flour. Cornflour was found to be most highly contaminated, and in general the results were satisfactory in the case of wheat flour. Examination of the "repeat" samples obtained from manufacturers who had previously submitted samples of low contamination was found to confirm the findings on the first samples. The investigation demonstrated that cereals may be obtained which are suitable without sterilising treatment as ingredients for canned meats and other non-acid canned products, and there is no indication that, where found, thermophilic contamination may be identified with the source of production.

Scotland's Loaf

Bakers are inclined to blame recent publicity given to the subject of the batch v. pan loaf for making the housewife prefer the latter instead of Scotland's national type of bread. A recent newspaper article was a pointed commentary at a time when the Ministry of Food had urged everyone to eat more bread, eat more of every loaf. That was Lord Woolton's method of enjoining against any waste.

Bakers now say that shop girls are having a hard time with housewives who insist on demanding pan loaves when none is available. Women, it appears,

are still slaves to fashion. If they feel that others are keen on pan bread they must fall into line, though the batch loaf, the only large output that Scottish bakers can produce, contains exactly the same flour mixture as that baked into pan bread—three parts of national flour of 85 per cent. extraction and one part white flour. Housewives need not mislead themselves that there is any difference.

It is suggested that, if demand for pan bread persists on its present scale to the disadvantage of batch bread, "would it not be expedient for the Ministry of Food to force the public back to batch bread by prohibiting the baking of pan loaves for, say, a month?" It seems a drastic suggestion, but we should then see the "sides" and "ends" problem solved at one stroke.

Waxed Fruits and Vegetables

Treatment of certain fruits and vegetables with wax emulsions is now an established commercial practice, state Warren B. Mack and José R. Janer (*Food Research*, Vol. 7, 1, 38). From 80 to 90 per cent. of the citrus fruits shipped from California, and almost the same proportion from Florida, are wax treated. Among vegetables, root crops are often waxed for market distribution, as are also cucumbers and tomatoes. The authors cite work done by previous investigators on the influence of waxing on respiration, physiological breakdown, fungous spoilage, flavour, etc., and record their experiments on cucumbers. The effects are described of treatment with a wax emulsion on the weight loss, dry-matter content, sugar content, respiration rate, respiratory quotient, physiological breakdown and changes in physical appearance of greenhouse cucumbers stored during three weeks in an ordinary room in midsummer, in a bank cellar and in cold storage. The most striking differences brought about by wax treatment were reduction in weight loss and in spoilage in the ordinary room; increase in pitting in cold storage, a characteristic low-temperature injury on cucumbers; and a significant increase in the respiratory quotient in cold storage, indicating a greater degree of suboxidation.

Popularising Canadian Cheese

A great cheese which Dr. James W. Robertson, the first Principal of the Macdonald College, Quebec, caused to be manufactured for showing at the World's Fair in Chicago in 1893 is recalled in the *Macdonald College Journal*. The idea came to Dr. Robertson while he was Dominion Dairy Commissioner at Ottawa, and he called in two dairy experts. The curd was prepared in several factories and was brought together in a factory at Perth, Ont.

"207,300 lb. of milk, the total product of 10,000 cows for one day, went into the manufacture of this gigantic cheese, which, when completed, weighed 11 tons. It measured 6 feet in height, was 28 feet across, and was encased in boiler plate. A special truck had to be constructed to take it to the C.P.R. Station, and two flat cars, specially strengthened by timbers, were needed to transport it to the Fair. It is notable that never, previous to the Royal Visit, did any tour draw such crowds as the progress of this colossal cheese. Great circus posters advertised its coming, and when it finally reached Chicago it was regarded as the sensation of the Fair. If Dr. Robertson had set out to astonish the world, he certainly succeeded."

The cheese was later sent across the Atlantic to Liverpool—an expedient not likely to be repeated in the near future—and it there made another sensation. The advertisement of Canada's products which was offered by the great cheese had lasting results in popularising Canadian cheese on the English market.

Ice Cream—And After

The decision of the Ministry of Food to prohibit the manufacture of ice cream after September 30 has not taken the industry entirely by surprise, though it was made without prior consultation with the manufacturers' representatives. As long ago as 1940 the Ministry drafted an Order to prohibit the manufacture of the product. Representatives of the Ice Cream Association heard about this when attending the Ministry, and they pleaded their case so successfully that the Order was never signed.

The precise effect of the Ministry's announcement cannot yet be determined, for the Department has issued no definition of ice cream, and the product has no legal definition.

During the last war Mr. J. R. Clynes, the Food Controller, made an Order prohibiting the manufacture of ice cream from January 1, 1918. The forbidden ingredients included milk and certain other products. Manufacturers found a means of avoiding these obstacles and of producing "frostine", which was a kind of water-ice. Its legality was challenged in court; the manufacturers won the day and the industry enjoyed one of its most profitable seasons, although ice cream was illegal! Until the present Food Ministry's definition of ice cream is known nobody can say whether or not a revival of "frostine" will be possible.

It is possible that no definition will be made and that the prohibition will extend to all frozen products such as ice cream and similar commodities.

Loss of Vitamin C in Raw Vegetables

Some experiments made with a view of ascertaining the rapidity of loss of vitamin C, which takes place when the cells of vegetables are mechanically broken, are reported by Dr. Magnus Pyke in a recent letter to *Nature* (Vol. 149, No. 3783).

During the analysis of vegetables for vitamin C, for example, it is important that all grinding or other subdivision of tissues should be carried out in the presence of metaphosphoric acid, so that vitamin C oxidase shall be inhibited before it has any opportunity of coming into action.

Losses of vitamin C were investigated when savoy cabbage and swedes are grated or shredded in different ways. When grated with a household grater as used for cheese or bread-crumbs, 34 per cent. of the vitamin had disappeared in 5 minutes in the case of cabbage, after which there was no appreciable loss over 3 hours. In the case of swedes the loss was not so rapid, but after 3 hours it had reached 75 per cent.

Shredding with a household shredder as used for suet resulted in a 10 per cent. loss for cabbage and a 39 per cent. loss for swedes, while shredding with a sharp knife produced no significant loss.

Very few people go to the length of shredding vegetables with a grater, but, apart from the special necessities of the analyst, it is just as well to bear in mind that the least possible damage should be done to the cells of vegetables when preparing them for the table.

New Anglo-U.S. Joint Boards

The creation of the Combined Resources and Production Board and the Combined Food Board follows from plans for collaboration agreed upon by the British and U.S. Governments last January.

The Combined Food Board will be composed of the Secretary of Agriculture for the United States and the head of the British Food Mission, who will represent and act under the instructions of the Minister of Food. The purpose of the Board shall be to co-ordinate and obtain a planned and expeditious utilisation of the food resources of the United Nations.

The duties of the Board shall be to consider, investigate, enquire into and formulate plans with regard to any question in respect of which the Governments of the United States and United Kingdom have, or may have, a common concern relating to supply, production, transportation, disposal, allocation or distribution in, or to, any part of the world of foods, agricultural materials from which foods are derived, and equipment and non-food materials used in the production of such foods and agricultural materials, and to make recommendations to the Governments of the United States and United Kingdom in respect of any such question; to work in collaboration with others of the United Nations towards the best utilisation of their food resources and in collaboration with any interested nation or nations to formulate plans and recommendations for development, expansion, purchase or other effective use of their food resources.

The Board shall be entitled to receive from any agency of the Government of the United States and any department of the Government of the United Kingdom any information available to such agency or department relating to any matter with regard to which the Board is competent to make recommendations to those Governments, and in principle the entire food resources of Great Britain and the United States will be deemed to be in a common pool, about which fullest information will be interchanged.

The new organisation brings production into line with the existing arrangements pooling Allied war resources.

The Butter of M. Hübner

In James Agate's latest book, *Here's Richness*, he quotes a paragraph from a Provençal newspaper, published during the last war, which may be useful to those who "queue". The translation is:

"M. the Professor Hübner of Berlin amuses himself with researches of the highest possible interest. Having observed that German maidservants are obliged to wait in a queue for four hours in order to receive 100 grammes of butter, the Professor has the brilliant idea to calculate the loss of vital energies provoked by this long standing.

"On leaving the house the girl has her grand complement of vital energies. She takes her place in the file of the beseeching ones. Her *Butter-Karte* is in the hand. From that moment the energies commence to escape! In proportion as the fatigue increases the loss increases. M. Hübner, spectacles on nose, observes, *avec passion*, the phenomenon. At the end of her four hours' wait the girl has disposed of a respectable quantity of energies.

"The learned one takes his notebook and calculates. So many energies are equal to so many grammes of butter. . . . Finally, the learned one finds that the girl has lost as many energies as would correspond to 52 grammes of butter. *C'est beau la science!* It is obvious, then, that after this prolonged stationment the poor exhausted one does not receive her 100 grammes of butter, receiving in reality only 48 grammes of the precious delicacy, since she has previously consumed 52 grammes without suspecting it. *C'est admirable!*

"Nor is this all. The Professor has pushed his deductions still further. If the girl instead of exhausting herself on the pavement had remained quietly in bed she would have gained, it appears, an amount of energy greater than the 48 grammes of butter obtained after four hours' painful quest.

Let us salute this super-learned Berliner. He has perhaps found the solution of the food problems the most *kolossal*. Sleep! counsels the Professor. *Restez couchés! Ne bougez pas!* During this agreeable repose your energies will increase and, as they are convertible into butter, you will enjoy an excellent *cuisine au beurre*, confectioned in the mysteries of your inside."

The Manufacture of National Bread

How white flour and wheatmeals differ and the modifications which should be applied to wheatmeal is the theme of this article, which should be of assistance to bread manufacturers in producing the best bread possible.

H. C. FREEMAN, A.M.C.T., A.I.C.

THE NATIONAL change-over from white flour to 85 per cent. wheatmeal has caused bakers throughout the country to be keenly interested and concerned with the production of wheatmeal bread of consistently good quality. It speaks well of the baking trade as a whole that small and large bakers alike, whether they are baking two or three or hundreds of sacks of flour a week, are equally concerned with producing the best bread possible and giving the public a "National" loaf which they can enjoy. The compliment paid to the baking trade some weeks ago by Lord Woolton at the first National Bread Competition was well deserved.

The general aim seems to be to produce wheatmeal bread which resembles as closely as possible white bread in volume and texture, which can be cut and spread without crumbling, and which keeps moist eating for two or three days. Flavour and crumb colour are two features in which white bread and wheatmeal bread cannot be expected to compare, but there is a desire on the part of the manufacturers not to make the National loaf any darker in crumb colour nor any more branny in composition than need be. Although it is generally agreed by the majority that in all the above respects wheatmeal bread is generally inferior to white bread, it should not be concluded that the former is of poor quality. In fact, much very good bread is at present being produced from the National meal, and there is a steady improvement in quality.

It must be remembered that the quality of bread produced in this country has been of the highest order, and millers and makers are to be commended for the manner in which they are aiming at maintaining the same superlative quality in the National loaf. It is hoped that the following explanation of how white flour and wheatmeals differ, and the recommended modifications that should be applied to wheatmeal, will be of assistance to bread manufacturers in producing the best bread possible, and particularly to any bakers who have been experiencing difficulty in the manufacture of this bread.

Let it first of all be made clear that the manufacture of National bread does not call for any major alterations in recipe or process, although certain minor modifications are essential. This is not surprising when one considers that the majority of wheatmeals at present being milled contain as much as 90 per cent. of fine flour and only about 10 per cent. of branny material which will not pass a sieve of 100 meshes per linear inch. The germ content appears to be anything up to 1 per cent. of the meal.

COMPARISON OF NATIONAL WHEATMEAL WITH N.S.R. FLOUR

Before describing the necessary modifications in procedure when changing from white to National breadmaking, a brief description of the pertinent differences between white flour and 85 per cent. wheatmeal would, no doubt, help the reader to understand the reasons for the modifications. Typical analyses of white flour (N.S.R. 75 per cent.) and National wheatmeal (85 per cent.) are as follows:

	N.S.R. Flour (75 Per Cent.).	*National Wheatmeal (85 Per Cent.).*
	Per Cent.	Per Cent.
Moisture	14·5	14·5
Ash	0·49	0·87
Fibre	0·15	0·75
Bran larger than 50-mesh	Nil	6·0
Bran between 50- and 100-mesh	Nil	4·0
Flour through a 100-mesh	100·0	90·0
Dry gluten (percentage in the flour portion) ...	13·5	14·0
Water absorption (gallons per sack) ...	15¾	16¼
Maltose figure (diastatic activity)	1·9	2·1

Gluten Strength and Water Absorption

Although present-day wheat mixtures contain a fair proportion of English-grown wheat, the fact that the bulk of the millers' grist consists of good-quality Manitoban wheat results in a meal of good strength. This is shown by the large percentage of good-quality gluten present in the floury portion of wheatmeal. The water absorption of wheatmeals is a little higher than N.S.R. flour, but is not so high as we frequently find with pre-war samples. This may be due to lower amounts of bran. Pre-war wheatmeals often contained as much as 15 to 20 per cent. of bran, whereas the National meal contains only about 10 per cent.

Diastatic Activity

The maltose figure determination and other methods of measuring diastatic activity show that wheatmeals are more active in this respect than white flour. This is a direct result of the presence of bran, because bran itself is more diastatic than the floury endosperm of wheat from which white flour is milled. A certain amount of diastase is necessary in the manufacture of bread in order to maintain a supply of fermentable sugars in the dough throughout the fermentation process.

Insufficient diastase results in bread of poor volume and crust colour, but too much diastase has even more harmful effects. These are mainly apparent as a

doughy, clammy loaf, which is difficult to bake thoroughly, sometimes with seams in the crumb, and are the result of the diastase converting too much of the starch into sugars, dextrins, etc. Recent tests have shown that by no means all wheatmeals contain an excess of diastase, but nevertheless it is true that wheatmeal bread does need more baking than white bread.

Effect of Bran on Baking Quality

The high ash and fibre figures obtained with wheatmeals are due to the presence of bran. Bran contains about 5 per cent. of ash and about 10 per cent. of fibre compared with 0·5 and 0·15 respectively in N.S.R. white flour.

While baking quality is largely dependent upon gluten quantity and quality, the bran does play an important part and has a pronounced effect in brown bread.

The size of the bran particles appears to be an important factor, and baking results show that the presence of fine bran or bran dust has a more harmful effect than coarser bran and produces a loaf of poor volume, with little oven lift and a lifeless type of crumb. The cause is most probably a mechanical or physical one brought about by the individual bran particles breaking the continuity of the gluten strands in the dough and thus destroying the structure and crumb formation of the loaf. If this is so it will be realised that each particle of bran will exert approximately the same harmful influence irrespective of its size, and therefore a given weight of very fine bran will have a far more detrimental effect than the same weight of coarser bran.

In addition, a large quantity of fine bran produces a crumb of dark colour instead of a crumb with a fairly white background interspaced with relatively large pieces of bran. It must not be assumed from these remarks that the other extreme of very coarse bran is entirely satisfactory, because its presence in the loaf would not be acceptable to the majority of consumers on account of appearance and palatability. A happy medium would seem to best suit the requirements of all, and wheatmeal in which the 10 per cent. of bran consisted of the minimum amount of very fine bran and no extremely coarse bran would be the most suitable.

Standardisation is more difficult with a product such as wheatmeal, which contains fine flour and various grades of bran, than with white flour. As time progresses we expect to find greater uniformity between wheatmeals, particularly in the total bran content, but there will always be difficulty in standardising the particle size of the bran, as this is appreciably affected by the nature of the wheats, degree of conditioning, moisture content at milling and various mill adjustments.

METHOD OF MANUFACTURE

As already mentioned, no major alterations in process are necessary when making wheatmeal bread, and good results can be obtained when using the same basic process as used for white bread. Fairly short processes of two or three hours to scaling, or longer processes of eight or ten hours to scaling can be satisfactorily employed, but, in order to obtain the best results from wheatmeal, minor but important adjustments, which are described below, are advisable.

Dough Time

The same length of fermentation process can be used as for white bread, but, if possible, avoid very short or extremely long processes. Very short processes of about one and a half hours to scaling, such as were previously used for wheatmeal, are not only unnecessary but are inadvisable, because the large amount of yeast necessary in a short process tends to destroy crumb structure and to cause crumbliness. The previous practice of making wheatmeal bread in a very short process was partly a matter of convenience, being only a small proportion of the baker's production which was often fitted in with other operations, and partly because pre-war wheatmeals were usually more branny and possessed poorer baking strength than the present National meal.

Experimental and commercial results have shown that processes of three to six hours to scaling give very good results, and good bread can be made in even longer processes. The better bread obtained from a longer fermentation process is illustrated in Fig. 1. The bolder loaf with more oven spring was made from a four-hour dough and the poorer loaf from a one-hour dough.

Water Absorption

It has previously been the rule to make wheatmeal doughs with much more water than white-flour doughs, as much as 17 to 18 gallons per sack being frequently

"... the better bread obtained from a longer fermentation process is shown here. The bolder loaf with more oven spring was made from a four-hour dough and the poorer loaf from a one-hour dough."

Fig. 1.

used. This is not advisable with National wheatmeal, and 16 to 16½ gallons per sack, which is about ½ gallon per sack more than the average for white bread, is ample for most wheatmeals. If too much water is used the dough is difficult to handle and the extra water only has to be baked out of the bread again, and, furthermore, the texture of the crumb becomes coarser and the keeping quality of the bread suffers.

Salt Content

More salt should be used than for white bread. Generally speaking, ½ lb. per sack is required. For short processes up to two and a half hours to scaling 4½ lbs. per sack is sufficient, from three to six hours to scaling 5 lbs. per sack, and for doughs which are longer than six hours to scaling use 5½ lbs. per sack. The extra salt not only improves the flavour of the bread but also strengthens the gluten, which results in a stronger crumb, less crumbliness and better keeping properties. The amount of salt must to some extent be governed by local custom, as bread in Scotland is more heavily salted than in the North of England and more is used in the North than in the South of England.

National wheatmeal doughs respond particularly well to the addition of yeast food. The use of such a product results in bread of finer texture, moister crumb and better keeping qualities.

Malt

Diastatic malt flour or malt extract should be used with caution. It has already been stated that wheatmeals tend to be more diastatic than white flour and explained how this diastatic activity affects baking results. Wheatmeals may, of course, differ in diastatic activity according to condition of the wheat from which they were milled, and some may be improved by the use of a small amount of salt, whereas others would be decidedly better without any. Non-diastatic or very low diastatic malts are obtainable which may be used in larger amounts as their effect is mainly upon flavour and, being non-diastatic, have little, if any, effect upon the baking of the bread.

Manipulation of the Dough

With regard to manipulation, the dough requires an average amount of mixing and is best knocked back half an hour before scaling. A fairly long first proof after dividing and before final mould is beneficial, as it allows the dough pieces to recover well, gives more freedom to the dough and improves the volume of the bread. Twenty minutes is not too long to allow for first proof. Final moulding should be as light as possible, as the dough will not stand a great deal of stretching and pressure at this stage. Final proof should be shorter than for white bread, and usually forty-five minutes is ample.

Too long a final proof should be avoided, because over-proving in the tins will produce a loose texture and weakness in the crumb. If an attempt is made to obtain as big a volume as white bread by giving a fairly long proof, the general quality of the bread will suffer, and it is therefore far more satisfactory to reduce the length in final proof and to be content with a loaf of just fair size.

Fig. 2 illustrates the inferior texture which results from over-proof. The two loaves in the photograph have been made on exactly the same process except that the right-hand loaf has had half an hour extra proof. Note the coarser and more open texture and the tendency for the top of the loaf to flatten out.

The size of tin plays an important part in wheatmeal bread quality. A reasonably small tin is better than a big tin, as it will produce a compact, shapely loaf with a good internal appearance. The tins used in practically all cases will be the same as previously used for white bread, and as these are generally on the large size care will have to be taken that the loaves are not proved as high in the tins as usual for white bread. If an attempt is made to fill these fairly large tins the bread will crumble when it is cut and the housewife will complain.

BAKING

Wheatmeal bread requires to be thoroughly baked, but this is more difficult than with white bread because the presence of bran tends to make a more stodgy and less porous loaf, which consequently offers greater restriction to heat penetration than the better vesiculated white bread. Also, as already mentioned, the more active diastase of wheatmeal has the effect of making thorough baking more difficult and at the same time more necessary.

It is advisable to maintain the oven at the usual temperature and bake for a few minutes longer—every

. . . This illustration shows the inferior texture which results from over-proof. These two loaves were made by exactly the same process except that the right-hand one has had half an hour extra proof. Note the coarser and more open texture and the tendency to flatten out.

Fig. 2.

additional minute make a very big difference to the thorough baking of bread. Too hot an oven may result in rapid baking of the outside of the loaves at the expense of the interior of the bread, which would not be completely baked out. A relatively longer time in an oven cooler than usual would ensure thorough baking, but, on the other hand, the bread would keep on growing too long in the oven and ugly shapes would be produced.

In order to put the above recommendations for the manufacture of National bread into a simplified and convenient form they can be stated as follows :

(1) Use a fermentation process similar to what you have used for white bread : extremely short processes do not give the best results. (See Fig. 1.)
(2) Use a little more water at doughing, but ½ gallon per sack more than for white flour should be ample at the present time.
(3) Use a little more salt, about 4½ to 5½ lbs. per sack according to the length of process.
(4) Diastatic malt flour or malt extract should be used cautiously.
(5) Give the doughs a formal amount of mixing, a knock-back half an hour before scaling, a fairly long first proof of fifteen to twenty minutes, but curtail final proof.
(6) Bake in an oven of average temperature as for white bread, but give the bread a few extra minutes in the oven. Avoid a cool or an excessively hot oven.

PREVENTION OF WASTE

Storage of Wheatmeal

The responsibilities of the baker do not start with making the dough, nor do they finish with the drawing of the baked bread from the oven. In order to get the best results out of the wheatmeal care must be taken that it is kept in good condition prior to use, especially if it is being stored for any length of time. Whereas the keeping qualities of white flour under reasonable conditions of storage are excellent, wheatmeal has a much shorter life and is more liable to be affected by unfavourable conditions. It is, therefore, more than usually important that good storage accommodation should be provided and a continuous watch should be maintained over the store and its contents. This question of storage has been the subject of articles in the milling and baking journals and other publications, and instructions have been issued by the Millers Research Association to their members. It is, therefore, not necessary to dwell at length upon the subject, but the following points are very important and should receive special attention :

(1) The store should be clean, dry, cool and well ventilated.
(2) The sacks should be piled in such a manner as to be easily examined, preferably on stillage and not in direct contact with the outside walls.
(3) Regularly and frequently examine all stocks for signs of dampness, deterioration and the presence of insects.

Wastage of wheatmeal might easily occur if stocks are kept without proper supervision, and it is the duty of all bakers to see that all stocks in their care are regularly examined and used in correct rotation.

Deterioration of Bread—Rope

Another form of potential wastage is the deterioration of baked bread. There is the usual trouble of staling, which unfortunately is more apparent with wheatmeal than with white bread, but to a large extent this will be counteracted by the baker producing the best quality of bread, and after that it is a responsibility of the consumer to prevent this type of wastage. Another, and what can be a more serious form of deterioration, is infection with "rope". The question of rope in wheatmeal bread has been very much to the fore during the last few weeks, and the majority of bakers know that wheatmeal bread is more liable to develop rope than white bread. This is due to the fact that rope (*Bacillus mesentericus*) is a bacteria from the soil and is therefore more likely to be present in wheatmeal than in white flour, which is comparatively free from the outside husk of the wheat. In the cool weather, when bread is easily and quickly cooled, little trouble is experienced, buf during the hot weather serious trouble may occur. All bakers will be, or should be, by now conversant with the instructions issued by the Ministry of Food on how to prevent rope and with the articles published on the subject in the various trade papers. Too much importance cannot be placed on the need of taking the necessary precautions, and briefly these are as follows :

(1) Have a good, vigorous fermentation.
(2) Bake thoroughly.
(3) Cool as quickly and as thoroughly as possible.
(4) Do not pack hot bread either on shelves or in vans.
(5) Educate customers to store bread in a ventilated bin and in a cool atmosphere.
(6) Keep all bakery utensils absolutely clean.
(7) Do not allow bread suspected of being ropy to be brought into the bakery nor to be put into vans, but dispose of all such loaves immediately after examination.
(8) During the warm weather add acid to the dough as a preventive measure and increase the amount if rope is suspected. The most suitable to use are acetic acid, vinegar or acid calcium phosphate. The amounts of these various acids which should be used when an outbreak of rope has occurred or is suspected are as follows :

Acetic acid (glacial), dilute with 20 parts of water	3 to 4 pints.
Acetic acid (80 per cent.), dilute with 16 parts of water	3 to 4 pints.
Acetic acid (30 per cent.), dilute with 6 parts of water	3 to 4 pints.
Vinegar (approx. 5 per cent.), undiluted	3 to 4 pints.
Acid calcium phosphate (80 per cent.)	1½ lbs.
Acid calcium phosphate (cream of tartar strength)	2¼ lbs.

Half the above quantities may be used as a preventive measure during the warm weather.

In the event of these acids being in short supply a sour dough method of inhibiting rope development can be used very successfully and without much extra

(*Continued on page 224*)

Correspondence

Vitamin C and Blackcurrants

DEAR SIR,—My attention has been drawn to the fact that the contribution by Dr. Geoffrey Bourne in the issue of *Nature* for February 14, 1942, contained a very serious misprint. The total needs for this country as far as vitamin C is concerned should actually be about 700 tons per annum, as corrected by Dr. Bourne in the following issue of *Nature* dated February 21, 1942, instead of 30 tons as printed in Dr. Bourne's paper.

I had not seen the correction of this misprint when I wrote my article published in your June issue and had not taken the precaution of checking the calculations of a physiologist of Dr. Bourne's eminence. Consequently my calculation that the entire blackcurrant crop could supply approximately one-quarter of the nation's needs, being derived as it was directly from Dr. Bourne's printed statement, is very wide of the mark. The figure should be about one-hundredth. It is unfortunate that the original error should have been the cause of this further misprint, and I very much hope that you will be able to give due publicity to this correction.

Yours faithfully,
VERNON L. S. CHARLEY,
In charge of Fruit and Vegetable Products Section.

RESEARCH STATION, LONG ASHTON, BRISTOL.

Grass as Food

DEAR SIR,—In confirmation of the reasonableness of my appeal for the recognition of the freshly grown leaf of grass as the best and most universally available "raw material" for the manufacture of human food, may I call the attention of the food industry to the pronouncements of Dr. Gustav J. Martin, of the Warner Institute for Scientific Research, New York, which have been circulated by the Associated Press of America.

Dr. Martin, by introducing into the human intestines a bacterial culture obtained from the cow, has succeeded in rendering men capable of digesting grass, leaves and even the bark of trees.

This same result, so far as grass and leaves are concerned, I have proved Nature herself to be sufficiently adaptable to be capable of bringing about without any adventitious aid, provided the human ego has the courage and enterprise to give her half a chance.

I have no axe of my own to grind in my advocacy of the use of grass as a green vegetable. I am simply calling the attention of my fellows to what was the first, and is the most widely available, green vegetable which a kind Providence has made available to all creatures, including man at the top of the ladder of evolution on this planet, as mechanism for the conversion of energy into a form assimilable by animal life at large.

The newly grown grass leaf which we get in lawn mowings is the most freshly stored energy in form assimilable by the animal life and is so fresh and pure that it has not yet been incorporated even into the growth of the plant itself. It is simply the stored "elixir of life", as the bees' cells contain the stored honey. It is "up to the food industry", who have shown their metal in the way in which they have made available to mankind in attractive and appetising form the "raw material" provided by bleeding meat and odoriferous fish, now that scientific experts have confirmed my pronouncement of the merits of grass as a source of the best food value, to apply their talent to a similar conversion of this more universally available raw material.

Neither the Ministry of Food, nor the Ministry of Health, nor the Ministry of Agriculture have given me more than mild contempt. Yet, if only a satisfactory "seed mixture" could be provided, frequent mowings would soon induce appetising and aromatic herbs to adopt a creeping habit, so that they could be included in the sward which we could mow off lawns. Then, at the first growth of the leaf in spring, the food of man could be mown, and with mere washing to remove impurities, could go straight to the consumers' table.

Instead of the farmer having to wait till after his produce has been cultivated to harvest, and till his harvested produce has been converted into mutton, beef, pork, and milk and its products, he would start getting his return straight away, to the enormous advantage of the financial position of the industry and the farmer's bank balance!

The very continuance of life, at its best, depends on food. Therein lies the grave responsibility of the food industry. Surely it is also a great privilege?

Yours, etc.,
J. R. B. BRANSON.

105, WESTBURY COURT, S.W. 4.

The Freezing-Point Test for Milk

DEAR SIR,—In your July issue, p. 204, mention is made of a report by Dr. G. H. Walker, Salford City Analyst. This states that certain samples had been examined by "the Hortvet freezing-point test", which indicated that they must be adjudged genuine milk. I introduced the determination of the freezing point of milk as a method for detecting adulteration in a paper under that title which appeared in the *Chemical News*, February 22, 1911. I subsequently found that it had previously been proposed by a German, Nernst, possibly the distinguished physical chemist. Several other people later on suggested and used it, one in Australia, one in Khartoum, one, I believe, in Holland. All used the ordinary Beckman apparatus. Hortvet used ether to freeze his sample when he determined freezing points of milk many years after Nernst, but I cannot see why the freezing-point determination should on that account be described as the Hortvet test; Nernst's name should be used or simply "the freezing-point test".

Yours faithfully,
W. R. G. ATKINS, Sc.D., F.I.C., F.R.S.

DEPT. OF GENERAL PHYSIOLOGY,
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The Birth of British Vegetable Dehydration

Great steps forward have recently been made in the knowledge of how to dry and pack foods so as to retain almost to the full their natural taste, appearance and nutritive value. The stability of dried foods in storage is generally taken for granted, but it is now known that retention of their desirable properties as foods, both as regards nutritive values and flavour, depends on appropriate treatment of the raw materials before drying and on protecting the dried product from atmospheric influences by packaging it properly in air-tight and water-tight containers. This article was written after a visit to one of the Ministry of Food's pilot plants, during which it was possible to see the operations in actual working, and to discuss the different aspects of the processes with the technical experts on the spot.

T. CROSBIE-WALSH, F.I.C.

THE DRYING of certain foods such as fruits, milk, etc., is not beset with very serious difficulties, but where the more sensitive foods such as vegetables are concerned the matter teems with problems.

Requisites for Dried Vegetables

The main objects to be aimed at are as follows :

1. The finished product should be palatable.
2. Its nutritive properties with reference to the original raw product should be unimpaired, especially in regard to its vitamin content.
3. It should be capable of being stored for reasonably long periods.
4. The cost of production should not be excessive.

A New Technique

The technique recently developed by the Department of Scientific and Industrial Research at the Low Temperature Research Station, Cambridge, has enabled a large-scale process to be evolved which, embodying the result of intensive investigation, has carried vegetable dehydration considerably further than ever in its history.

Well known to food technologists is the gap between laboratory work and factory operations. In the matter of dehydration that gap is being bridged by the experimental drying plants erected in different factories under the auspices of the Dehydration Branch of the Ministry of Food. It was one of these pilot plants, installed in a large food manufacturing concern, I visited recently.

Potato Drying

The drying of potatoes was in full swing on a scale sufficiently large to enable manufacturing " snags " to be detected and remedied, the lay-out being similar to that of a large-scale plant.

From outside the building the potatoes are delivered to the automatic washing machines, fitted with carborundum rollers.

Spread over a large department are metal-covered tables at which are seated a number of women operatives, who peel and trim the potatoes. Already they have acquired considerable speed and skill in doing this. At the present rate of production and due to the requirements of the process, sufficient material is prepared in nine hours to enable the other parts of the factory to work three shifts.

The peeled potatoes are conveyed to wooden vats of large capacity, in which they are stored, immersed in water, until being taken to the next stage. This part of the process does not appear remarkable until it emerges that it embodies an important treatment. This is the addition of small but significant amounts of sulphite, a small part of which is retained in the finished product. It has been found by experiment that one of the effects of traces of sulphite is to aid in the retention of vitamin C. These traces are eliminated completely during the subsequent cooking operation.

Shredding and Blanching

The potatoes are next cut by machine into shreds about 2½ inches long by ¼ inch wide. As the shreds fall from the machine they are subjected to a powerful water spray, which has for its object the removal of some of the starch in the outer layers. Without this starch removal the shreds have a tendency to stick to the wire of the trays or the conveyor belt of the drier.

The next item in the pre-treatment of the vegetables is one to which much importance is attached. Although at first sight a simple blanching treatment—a familiar one in the vegetable canning industry—it has several

special aspects; including the adjustment of the *p*H value of the material.

Blanching is carried out by loading the potato shreds in large baskets and lowering these into tanks, in which the material is subjected to boiling temperature for a short time. The method employed is "serial" blanching—the same liquor is used for successive treatments, with the result that there exists between potatoes and liquor an equilibrium which obviates the loss of soluble constituents from the former.

Experiments on an industrial scale are being conducted with an alternative method—steam blanching—the equipment for which was being installed at the time of my visit. Immediately after emerging from the blanchers, the potato shreds are plunged into cold water to arrest the cooking process. The aim of the blanching process is to destroy the enzymes without softening the material. Incidentally, it drives off a certain proportion of the moisture.

Types of Drying Equipment

Two types of driers are in use at the moment for experimental purposes. Their actual effect on the finished product is the same, and the final selection of the type depends upon such factors as economy of labour and steam. It is probable that features of both driers will be incorporated in the final design.

The first type consists of a tunnel, through which the product is carried by an endless metal belt and is subjected to a blast of heated air. In this drier there are five separate zones, each zone having a progressively lower temperature. The temperatures, which are automatically controlled, are as follows :

1st zone, 200°-210° F. ; 2nd zone, 180°-190° F. ; 3rd zone, 160°-170° F. ; 4th zone, 160° F. ; 5th zone, 150° F.

The other drier is of the static type, and was designed by the Department of Scientific and Industrial Research. This has a drying area greater in comparison with that of a tunnel drier of similar cross-section, but requires more labour. The product is spread out on trays, which are contained in a frame which holds fifty of them. The drier has a capacity for eight frames, which remain stationary during the drying process. Heated air is forced across the trays by means of fans.

The finished product contains about 5 per cent. moisture and is of uniform texture and colour.

Packaging

The final step—one of the most important—is the packaging of the dried vegetables. This is carried out with extraordinary precautions and according to a technique which is original and entirely worked out in this country.

The standard containers are rectangular 4-gallon tins, which contain about 9 lbs. of dried potatoes and 4 lbs. of dried cabbage.

The filled tins are closed with a soldered cap, after which practically all the air is expelled from them. To do this the tin, previously perforated in two places, is loaded into a metal chamber of rectangular shape, capable of holding four tins. The air in the chamber is then removed by means of a vacuum pump, a final pressure of as low as 4 mm. of mercury being obtained. The connection to the vacuum pump is now closed and nitrogen is allowed to enter the chamber until the gauge indicates a point slightly above atmospheric pressure. The tin is now rapidly removed and the two holes closed by soldering.

Lastly, the tin is tested for leaks. It is fitted with a special device whereby it is perforated without allowing air and water to enter the perforation. This consists of a metal point, which is contained in the centre of a rubber cap, which sits firmly on the side of the tin. This cap is fitted with a tube connected with a cylinder of nitrogen. Fitted thus, the tin is plunged into a tank of water, a pressure of gas built up, and bubbles are watched for. If none appear the tin is duly passed as perfect and is ready to be packed in fibre-board cases ready for shipment.

Preparation of the Dried Products

The comparative ease with which cooking of the different dried vegetables is effected is demonstrated by the following quotation of the instructions which will be issued to those receiving them :

Dried Cabbage.—Cover with boiling water, cook 25 to 30 minutes, adding more water, if necessary.

Dried Potato.—Cover with boiling water, keep hot (not quite boiling) for about an hour. Simmer for 20 minutes in this water, adding more if necessary.

Dried Carrot.—Cover with boiling water and stand overnight without heating. Simmer 35 to 40 minutes in this water, adding more if necessary. Or : Cover with boiling water, keep hot (not quite boiling) for 1 to 2 hours ; cook as above.

I examined and tasted the products after preparation for the table. There were four varieties available—mixed soup vegetables, potatoes, cabbage, and carrots. Their colour, taste and texture left nothing to be desired.

The foregoing description has been of the drying of potatoes, but the same methods, with certain modifications, are used for other vegetables.

With regard to large-scale production, the Ministry is arranging for it to be started before the end of the present year. It is emphasised that while large orders have been placed by the Forces, with the scale of production now being planned, dried vegetables will not ordinarily be offered to civilian consumers.

Meat Drying

Samples of dried meat have already been received from South America, Australia, New Zealand and U.S.A., being the result of experimental work that has been done during the past twelve months, mainly as a result of the inspiration of work done at Cambridge. The samples, sufficient to supply 90 caterers and canteens for adequate testing, have been favourably reported upon, and the Ministry is fairly confident that small regular supplies of the meat, which is in minced form, will be available almost immediately.

Butter

Shipments of dehydrated butter fat have been received from the Southern Dominions, sufficient to permit of experiments being made on a commercial scale. The butter fat is not for retail distribution, but it is being tried by certain food manufacturers who are equipped with the necessary machinery for processing it.

Some Problems of the Cold Storage of Fish

DR. C. L. CUTTING.
Department of Scientific and Industrial Research
(Torry Research Station).

A CONSIDERABLE quantity of cold-stored fish has, in the past, been frozen by one of two methods:

(1) "Sharp" frozen, as fillets, in one-stone wooden boxes. This is very slow freezing; in a store at −4° F. (−20° C.), even with moderate air circulation, the fish in the centre of such packages take about thirty hours to cool through the critical interval of 30° to 23° F. (−1° to −5° C.).

(2) "Rapidly" frozen, mainly as fillets, by one or other of the equipments on the market; the freezing time might be expected to be about one hour.

Effect of Slower Freezing

The much greater damage to the cellular structure of the fish produced by the slower freezing can be revealed with some precision by making a smoke-cure by the usual method, which is a very sensitive test. When the freezing time begins to exceed about two to three hours, the gloss of the smoke-cure becomes thinner and the surface appears more matt, owing to microscopic surface disorganisation, and with very slow rates the actual flakes begin to gape and the fish presents a very ragged appearance.

The effect of progressively decreasing rate of freezing can also be convincingly demonstrated by photomicrographs of histological sections. However, when it comes to examining the thawed article itself a short time after freezing, differentiation becomes much more difficult. Fish that has been thawed immediately after freezing can hardly be distinguished, by appearance and texture, from fresh fish; though fish that has been frozen very slowly looks perhaps slightly duller when thawed than fresh fish, while rather more juice can be squeezed from cut surfaces of the thawed fish than from those of the fresh fish. In addition, it is impossible to distinguish with certainty the influence of varying the rate of freezing as judged by tasting the fish after steaming in casserole or frying in fat.

Quality of Fish after Storage

Even after one month's storage at −22° F. (−30° C.) there is little difference in appearance and texture between rapidly and slowly frozen lots, both being excellent; the latter is very slightly softer, a little less glossy, somewhat more "springy", and yields a small quantity of juice with pressure as compared with the rapidly frozen fish, from which practically no juice can be obtained. After one month's storage at 14° F. (−10° C.), rapidly frozen fish, although still shiny and glutinous, is not so elastic and yields considerably more expressed juice than when stored at −22° F. (−30° C.). Slowly frozen fish is very opaque in comparison, shows ice-pittings, and yields abundant juice. The effect of rate of freezing is therefore quite noticeable when stored at the higher temperature, although it is difficult to distinguish the influence on palatability alone. The effect of temperature of storage also becomes noticeable after one month; fish stored at 14° F. (−10° C.), moreover, begins to develop slight change in odour. After this time the effect of temperature of storage, although only just beginning to show itself, is of greater practical importance than the influence of the rate of freezing, so that the most slowly frozen fish stored at −22° F. (−30° C.) is already somewhat superior to the most rapidly frozen fish stored at 14° F. (−10° C.).

Effect of Long Storage

After longer storage, say four to five months, at −22° F (−30° C.), rapidly frozen fish is still very similar to fresh fish, but is slightly softer, less elastic, slightly whiter, yields a little expressible fluid and has possibly a very slight storage odour. Slowly frozen fish is slightly whiter still, has possibly a slightly looser texture with some gaping of flakes, more readily yields juice, and has apparently also somewhat more storage odour.

The effect of different rates of freezing is thus, on the whole, not much more marked than after one month; after four to five months at 14° F (−10° C.), however, rapidly frozen fish is quite opaque, spongy, less glutinous, more "fixed" and inelastic, cutting rather like cheese. Expressible juice is copious, "freezer burn" evident, and there is a sweetish, malty, somewhat "salt fishy" storage odour, and some "yellowing" of the surfaces. Slowly frozen fish has definitely more expressible juice, and looks considerably worse. The effect of rate of freezing, on the whole, is more apparent than at −22° F. (−30° C.).

Tasting tests have not proved conclusively the effect of rate of freezing on palatability. On the other hand, the effect of temperature of storage can be clearly distinguished. It may be quite definitely stated that slowly frozen fish stored at −22° F. (−30 C.) is in all respects superior to rapidly frozen fish at 14° F. (−10° C.) at any time after one month's storage.

A considerable number of comparisons recently carried out between fish frozen whole and split or filleted have shown that when thawing is to be followed by smoke-curing the smoothest cut and most shining pellicle is generally obtained in the case of the whole fish. This is much more evident in the case of cured white fish, such as haddock, whiting and cod, than in the case of kippers, in which oil produces a shining

surface and any slight bleached appearance is obscured if, as is normally the case, the fish are dyed. When fillets are frozen slowly, as in one-stone boxes, it is better to keep the skin on in order to minimise breaking of the thawed fillets .

"Drip Losses"

The considerable loss of weight that occurs during the thawing and subsequent handling of imported frozen fillets has been the subject of comment in trade journals. In the first place, prior to thawing, weight may, of course, be lost through evaporation in cold store, and this may be largely prevented by lowering the temperature well into the range −4° to −22° F. (−20° to −30° C.), and completely prevented, even at higher temperatures—*e.g.*, 14° F. (−10° C.)—by the use of impermeable wrappers, although this has no effect on certain deteriorative cold storage changes not associated with evaporation (see below).

Even under the best conditions of temperature and wrapping, however, some loss of weight is generally experienced in thawing and subsequent handling through simple "drip" and expression of juice. This is particularly the case with the customary one-stone box of fillets that has been frozen slowly, and stored for some part of the storage cycle, possibly a few weeks as during ocean transport, at temperatures as high as 14° F. (−10°).

Treatment of Fillets with Salt

Treatment of the fillets with a salt solution prior to freezing greatly minimises the loss of fluid after thawing, owing to the water-retaining capacity of salt-protein complexes formed.

In one experiment, dipping haddock fillets for two minutes in 20 per cent. brine before freezing and storing at −22° F (−30° C.) for three months, reduced losses due to drip from about 5 per cent. to about 1 per cent., although in the case of the fish stored at 14° F. (−10° C.) the reduction is less marked because losses of water occur owing to evaporation during storage.

Treated fillets become yellowish, especially along the line of the blood-vessels, noticeably at −22° F. (−30° C.) and markedly so at 14° F. (−10° C.), and after thawing tend to stick together so that separation is difficult and may result in tearing and breaking. This could be prevented, no doubt, by freezing the treated fillets in layers separated by waxed paper, a method proved to be successful when separate fillets from one box are required for cooking in the frozen state. This latter procedure, which gives an excellent result, incidentally gets round the difficulty of losing weight by "drip" or expressed juice in handling.

Fillets treated with salt solution also develop a marked "salt fishy" aroma, particularly at the higher temperature of storage, which is not destroyed by cooking.

The impairment of colour and palatability, together with the stickiness, in fillets that have been dipped in brine before freezing, more than offsets the advantage of the reduction in "drip".

The effect of salt on flavour and odour recalls the slight "salt fishy" aroma which occasionally develops even in quite well-washed and "glazed" brine-frozen whole fish stored at −22° F. (−30° C.). Treated whole fish develop less "off" and salty flavour than fillets. "Drip" from thawed, untreated whole fish is always much less, irrespective of temperature of storage, and seems particularly associated with cut surfaces and removal of skin.

Drying of Fish in Cold Store

It is becoming widely realised that, for all kinds of frozen fish, the lower the temperature of storage, the longer they retain the characteristics of the fresh fish. However, quite apart from the development during cold storage at the usual commercial temperatures around 14° F. (−10° C.) of protein changes, which affect texture and "mouthfeel" and enzyme action, producing "off" flavours, the mere physical effect of dehydration plays a large part in the deterioration. For one thing, it can be quite obvious to the eye as "freezer burn", which is the trade name for the toughened, wrinkled patches on the surface of the product caused by intense local desiccation. In addition, it produces effects noticeable to the palate, since drying also extends to the interior, with the result that the texture becomes loose, inelastic and spongy, while remaining tough and dry on the surface. There is, of course, also quite a noticeable loss of weight.

The results of several series of experiments carried out over the past few years with white fish, such as haddocks and lemon soles, both fresh and smoke-cured, are summarised in Table I. In large commercial stores the losses in weight may be lower, but the order of the effect of lowering the temperature would be the same.

TABLE I

LOSS OF WEIGHT OF FISH DURING COLD STORAGE

	Per Cent. per Month Loss at Storage Temperature of:			*Per Cent. Loss in Air Freezing.*
	14° F. (−10° C.)	*−4° F. (−22° C.)*	*−22° F. (−30° C.)*	
Exposed	7	3·5	1·5	2·3
One-stone boxes ...	2·3	1	0·25	0·5
One-stone boxes lined with waxed paper	0·75	0·5	0·1	0·5
Theoretical ratios (taking −30° C. as 1)	(6·7)	(3·9)	(1)	—

Fatty fish, such as herring and kippers, are observed to lose weight somewhat less rapidly at all temperatures. Mr. J. K. Hardy, of the Ditton Laboratory of the Department of Scientific and Industrial Research, was responsible for working out the theoretical relationships, further details of which may be obtained from other publications.[1]

The above results dispose of the objection sometimes made to the use of lower temperatures of storage, that desiccation would be thereby increased. On the contrary, there is less drying the lower the temperature.

Good reasons may, therefore, be given for using lower temperatures of storage, quite apart from considerations of palatability. The appearance of the thawed fish is definitely improved at lower temperatures

of storage, and the onset of " freezer burn " can be delayed and even entirely prevented. Moreover, the economic loss is reduced. Normally for storage at 14° F. (−10° C.) for three to four months, 1 to 1½ lb. extra of fish is put into one-stone boxes. At −22° F. (−30° C.) this so-called " overweight " is reduced to about 2 to 3 ozs. per stone for six months' storage and can therefore be neglected.

In addition, fatty fish, such as herring, kippers and salmon, have in the lateral brown streak a catalytic system which promotes rancidity, the action of which is accelerated by superficial drying.[2]

If lower temperatures of storage, such as are now recommended, are not available, it may still be practicable to prevent or reduce the effects of drying by—

(1) Ice-glazing the fish.
(2) Maintaining a higher relative humidity in the store.
(3) Using impermeable wrapping materials.

(2) requires radical modifications in cold-storage equipment. In the case of (1), during subsequent storage it is the glaze which evaporates and not the moisture from the fish. The overall weight of ice taken up as glaze can be as high as 10 per cent., but usually varies from 2 to 7 per cent., being lower for the larger fish. The deposition of ice may be uneven, and since the glaze also evaporates unevenly, it is advisable to reglaze the fish before this full amount of weight is again lost. Even with storage at −4° F. (−20° C.) the fish should be reglazed after four months. Reglazing presents difficulties in the case of fish frozen and stored in boxes. At −22° F. (−30° C.) reglazing is unnecessary for all normal periods of storage.

It must be emphasized that although the above methods lessen change in appearance and loss of weight due to dehydration at high storage temperatures, they do not affect the rate of deterioration due to such factors as loss of gelatinous consistency of fresh fish, increase of " drip " and development of " off " odours and flavours and rancidity.

Effect of Rate of Freezing on Smoke-Cured Fish

The bulk of commercially cold-stored, smoke-cured fish is frozen in air in one-stone boxes or half-stone boxes, the freezing time being commonly of the order of 10 to 30 hours. If, however, the temperature is maintained at −4° F. (−20° C.), or below, a very good product comparable with freshly smoked fish is obtained after some months of storage. Since equipment for freezing packaged fish rapidly is becoming more common, it may be asked whether the quality of smoke-cured fish would be appreciably improved by more rapid freezing.

When kippers that had been very rapidly frozen and very slowly frozen were compared (the respective times for the interval 32° to 14° F. [0° to −10° C.] being thirty minutes and thirty hours) immediately after freezing, both lots of thawed fish were indistinguishable and all tasted in every way as good as the unfrozen control sample. After four months they were not appreciably different in flavour, but there was a slight difference in texture; the slowly frozen fish were softer and juicier and actually were preferred, if anything.

It would appear that little is to be gained, at any rate in edibility, by freezing kippers more rapidly than is generally customary. The temperature of storage is the factor of overriding importance.

Influence of Chilling and Humidity on Keeping Quality

The smoke-curing of fish is a method of quite short-term preservation, which depends as much upon inhibition of growth of moulds and bacteria by the drying undergone, particularly at the surface, as upon the absorption of antiseptics, such as formaldehyde and cresols, from the smoke itself.

For a satisfactory kipper, the cure or loss of water should amount to between 15 and 25 per cent. of the weight of the fish. A good " finnan " haddock should have lost not less than 15 per cent. " Pale " cures, such as block fillets of small whitings, are usually dyed, and the loss can be less than 10 per cent.

It has been found that the external relative humidity over the range 40 to 95 per cent. of saturation does not appreciably affect the rate of spoilage, either at 32° F. (0° C.) or at shed temperature varying between 55° and 65° F. (13° and 18° C.), probably because equilibrium conditions were not at all closely approached at the surface of the fish owing to diffusion of moisture from the interior.

Both smoke-cured white fish and kippers in the course of spoilage become covered with a sticky slime of micro-organisms, and, especially in the case of the drier cures, moulds also commonly become visible.

White fish and kippers develop characteristic " off " odours and flavours, but, without describing these further, Table II indicates approximately the times for which three commercial cures in an experiment at the Torry Research Station kept in really good condition (*i.e.*, not appreciably distinguishable in any way from freshly cured fish) and the times after which they became definitely unpalatable.

TABLE II

THE KEEPING QUALITY OF SMOKE-CURED FISH

Cure.	*At 32° F. (0° C.)*		*At 55°–65° F. (13°–18° C.)*	
	Good. (Days.)	*Unpalatable. (Days.)*	*Good. (Days.)*	*Unpalatable. (Days.)*
Pale-cured dyed block fillets of whiting ...	2½-3	6-7	1-1½	2½-3
Well-cured finnan haddocks ...	4-6	15-20	2-3	4-6
Kippers (about 15 per cent. cure) dyed	4-6	15-20	2-3	5-6

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[1] Cutting, C. L., and Hardy, J. K. : *Proceedings of the British Association of Refrigeration*, Vol. XXXVII (1941); Annual Report of the Food Investigation Board, 1938, p. 245.

[2] Banks, A. : *Ibid.*, p. 106.

The Baking Industry after Three Years of War

By EDMUND B. BENNION, M.Sc.Tech., F.I.C.

AFTER THREE years of war the baking industry can be said to be emerging with flying colours. Like all other industries, it has had many problems, restrictions and difficulties with which to contend, but as each problem has presented itself or each new regulation been announced—very often with very short notice—a willingness has been shown by all sections of the trade to co-operate with the Government and play their part. This active and willing co-operation has been acknowledged on several occasions by the Minister of Food himself.

The Position To-day

Surveying the position as it is to-day, what do we find? We find that there is a plentiful supply of bread and fermented goods and a fair spread of confectionery. In some places the quantity of confectionery available is limited. That is often where quality is being maintained and where there are also more people purchasing confectionery than in pre-war days. In other places there seems to be reasonable quantities, and often this is where the quality has been reduced to a wartime basis in order that the available materials can be spread over as wide a purchasing public as possible. This policy has ensured that each customer gets a variety, but the quality of the confectionery has suffered greatly.

The greatest change of all has been in the removal of the white loaf and the introduction of the National 85 per cent. loaf. This is a subject on which much already has been, could be and will be written.

Up to the present time no person in the British Isles has been short of bread whatever conditions have prevailed. No one has been without confectionery or biscuits. These latter have been difficult to procure at times, but procurable they have been in all places.

While the baking industry has maintained production of the finished product during these years, the planning and rationing schemes of the Ministry of Food have provided a continuous supply of necessary raw materials on a fairly generous scale, despite all the many difficulties which have had to be faced in getting the supplies to this country.

Throughout these three years the public have been well fed, and a good service has been given to them despite curtailment of delivery facilities.

Bread Production

Recapitulation sometimes serves a useful purpose, particularly after the lapse of years. After the outbreak of war, National straight run flour was introduced, and the marked improvement in flour quality was at once noticed, particularly among those who had hitherto used bakers' grades of flour. 75 per cent. extraction flour was introduced, and this held for the first year of the war. During this period the average quality of bread available in the country was never better, and there were many who said, "Let us have this kind of flour *after* the war as well." Plenty of Manitoba wheat was being used, and this was reflected in the quality of the bread. When the extraction was increased to 78 per cent. the change in the quality of the bread was hardly perceptible, and certainly the public never noticed it. There were fewer complaints during this period than there had been for many years previous. When the National wheatmeal loaf was first introduced the baking industry made considerable effort to popularise it, but it had only a limited appeal. However, now that this is the universal bread of the country the public are accepting it as a wartime measure. At the back of their minds, however, is the hope that as soon as possible after the war white bread will be restored to the dietary and any deficiencies in diet—if such there still be—be supplied in other ways.

National bread at the present time is not the full 85 per cent. loaf in the vast majority of cases, for white flour is still being released from security stocks. This means that some bakers are able to carry on with the use of 25 per cent. of white flour, while others use a slightly smaller percentage. Many bakers are now using entirely the 85 per cent. flour in their bread.

Production Problems

From the production end, National flour has brought many problems, not least of all, however, fermentation problems. Since the majority of bakers have for years been under-fermenting their doughs, the National flour has enabled them to get better fermented doughs. Dough temperatures must be kept within a range of 78° to 82° F., according to the type of bread being made, otherwise trouble results. This will mean lower initial temperatures from the mixers in many cases. Under black-out conditions it is extremely difficult to keep the dough temperatures low enough without using ice-cold water. With warm, summer conditions it is a matter for constant vigilance to control dough temperature and so ensure controlled fermentation. There is a certain saving of yeast, averaging about 10 per cent. There is need, however, for an increased salt content, firstly, because of the higher water absorption and, secondly, because the flour itself seems to require the extra salt to bring out flavour and help in retaining moistness in the finished bread.

When machine production is carried out there is a great deal more waste than with white flour since, owing to the sticky nature of the dough, the doughs are more difficult at the dividers and moulders and more dusting flour is necessary throughout production to facilitate handling and prevent sticking. This has been more marked since rice cones became unavailable. It is, however, surprising how well the flour stands up to mechanical treatment, and no extra recovery time need be given if the doughs are correctly made, fermented and handled.

Although the National flour does not possess the tolerance of white flours, it is again most satisfactory to find a margin of tolerance which is sufficient for automatic plant work.

Many people have claimed that longer baking is required, but from the author's experience this is not so, unless hitherto unduly short baking times had been used. Wherever adequate baking times had hitherto been used, then the same procedure can be followed to-day. With soda bread, however, more baking is certainly required, otherwise unseemly cores are obtained.

Altogether the quality of National bread is good, and this in part is due to the standard of the flour from which it is made. Most millers to-day seem to be milling to the required standard, and there is more uniformity among the flours from the various mills than when the meal was first introduced.

Fermented Small Goods

Since the rationing of all confectionery materials there has been an increased output of fermented small goods. These provide a means of obtaining the best spread out of rationed materials, such as fats and sugar, and of producing the most appetising and nutritious articles from them.

With National flour, however, the attractiveness and palatability of these products are considerably reduced. The wheatmeal flavour persists despite the addition of fat, sugar and fruit, and there is a sameness about all of them. The use of eggs in these goods provides the best means of improving them, and as the Ministry of Food have expressed the wish that foods should be made as rich as possible, their use in fermented small goods should be considered.

Confectionery

No side of the baking business has shown greater changes than the flour confectionery. We were gradually brought round to a proper conception of the state of affairs by gradual limitation of raw materials and rationing of primary commodities, followed by the Sugar Order forbidding the external decoration of cakes with sugar after baking. With all the restrictions imposed, freedom of action to produce any range of confectionery has until now been maintained, so that it has been possible to give the public a fairly good range. The brains of the industry have been utilised to make attractive articles which have helped to make up for other deficiencies in the pre-war range of goods. Of recent months there has been under consideration the question of limiting the number of confectionery lines, but this seems hardly necessary since the National flour has helped to solve this problem. This may, however, be done if price control is to be exercised, as seems a possibility. It is extremely difficult to produce a wide range of confectionery since, as with fancy breads and biscuits, the wheatmeal flavour predominates unless artificial flavourings are used, and many of these do not blend at all satisfactorily. Ginger and spices are the two best means of counteracting the wheatmeal flavour.

Effects of Fat and Sugar Production

Owing to the smaller amounts of fats and sugar available, revised formulæ for cakes were very soon introduced, followed by modification of technique and procedure. As a result, many confectioners have had their ideas of cake-making revolutionised and the technology of flour confectionery has made great progress. With the non-availability of frozen and fresh eggs and the introduction of dried whole egg, further modification of procedure in using them has again shown the technical skill which is available in the trade. The Ministry of Food has been most helpful in this direction by encouraging research carried out on the beating qualities of dried eggs, and a paper has been published in the *Journal of the Society of Chemical Industry* on this subject by Bennion, Bate Smith and Hawthorne.

The ingenuity of other people has been manifest by the introduction of substitutes, which have had a tremendous sale and which at one time promised to become one of the scandals of the war. There are few substitutes of any merit, and it was surprising how many people were gulled into buying mixtures consisting mainly of flour sold as milk or egg substitutes at exorbitant prices. The action of the Ministry of Food in controlling the production of these substitutes has to some degree restricted their production, but at the same time has almost legalised the situation. As a result, there are those who think that because the product is manufactured under licence it must be a reputable substitute. At their best none are real substitutes, but merely aids to production of confectionery.

Emergency Bread Production

The Ministry of Food have been very active in making plans for the maintenance of bread supplies in case of an emergency. Before the outbreak of war plans had been made to deal with bread supplies in many areas, but since then planning has been on a national scale and the organisation has been well tested on many occasions. On all occasions when important towns have been blitzed, bread has always been available to the public within twelve hours. Mutual assistance pacts and national planning have seen to this. At the present time attention is being focussed on the maintenance of bread supplies in the event of invasion. The Ministry of Food are organising demonstrations of emergency methods of bread production all over the country, and have already issued two pamphlets on the subject. It is understood that a brochure is shortly to be issued dealing more fully with this subject. All bakers should carry at least three days' supply of yeast, and more where refrigerated space is available. This yeast should be used in rotation, and where cold storage is provided no deterioration will occur during this time. Dried yeast is a useful reserve product, and under normal storage in a cool store it will keep for six months without any serious deterioration. After six months the yeast should be put into ordinary consumption, using 25 per cent. of it with fresh yeast. In this way the stock can easily be turned over without any interference with ordinary production.

Malt extract should also be held in reserve since for the production of malt barms as a means of conserving yeast and maintaining normal production procedure no better method can be employed, and by this method a week's reserve supply of yeast can be made to last for at least a month.

Rope in Bread

More people have heard of "rope" in bread of recent months than ever before, but if they depend on the

answers given in the House of Commons as to what is rope they will still be very little more enlightened.

Rope is a disease which sometimes occurs in bread, particularly in hot, damp weather, and in normal times in parts of the country where there are warm summers with fairly long periods of relatively high humidity. The first signs of it are evidenced by a sickly, fruity smell resembling overripe pineapple or strawberries. People often complain of the bread being sour at this stage. The next symptom is that the bread crumb goes damp at the centre and eventually will stick to the fingers and then can be drawn out in fine threads. Ultimately brown spots or streaks occur when the disease has reached an advanced stage.

Rope can occur in any products made from flour, particularly bread, provided they are not kept under satisfactory conditions. Since rope is caused by spores which pass from the outside of the wheat grain into the flour or meal, it follows that the greater the amount of bran present in a meal or flour, the greater the potential risk of rope. Since National flour contains a proportion of bran it is for this reason that attention is now being focussed on the possibility of rope trouble during the next few months. Prevention of rope is a responsibility which lies on all who handle bread—the baker and the public. If the baker produces well-fermented bread and cools it properly before it leaves his premises, then he has played his part. The next step is for the public to store the bread under such conditions in well-ventilated pantries so that no development occurs there. Storing bread in cloths, closed tins or bread-pans is the worst possible way of handling it at the present time. Although this method is adopted to keep the bread moist and to prevent waste from dried-out crusts, the waste may be greater if the bread becomes ropy. It will be necessary to put up with a few dry crusts rather than risk the greater loss which would occur if rope developed.

Attention is being given to this matter by the Ministry of Food, and provision is being made for acetic acid and acid calcium phosphate to be available to the trade should trouble occur, since these are the best means of countering rope. The rope bacillus will not work in an acid medium, and for this reason suitable additions of acid added to the dough will inhibit the subsequent development. Other methods of utilising sour dough as an inhibitor have been worked out and are very satisfactory.

Rope may occur just as easily in confectionery made from National flour, and so the public should develop the habit of eating both bread and confectionery while it is fresh and carrying no more than two days' supply, and peacetime practices must be put on one side for the duration.

Costings and Distribution

Since the commencement of war the Ministry of Food have been investigating the costings of bread production, and as a result of their findings the various subsidies have been allowed and the price of bread has been controlled. Price control of bread has been Government policy, and both the Ministry's costings advisers and those of the baking industry have been working together. Much valuable data has been accumulated, and if it is ever published it will be most valuable to the industry as a whole. The most recent findings indicate that the last secondary subsidy is no longer justified. The findings of the Ministry's costing experts are now being contested by the industry, for it is felt that these apply to plant bakeries and not to the smaller bakers, who are an essential part of the baking industry in wartime whatever their function may be deemed in peacetime. When the war is over, with the amount of data on costings which has been acquired, more real progress should be made in the industry than ever before.

With the operation of the three-day-a-week delivery system considerable saving in transport and man-power has been effected. Further, it must be obvious that one of the greatest problems of making rounds pay has also been solved. The three-day-a-week delivery system, although new to the majority of people in England, has been carried out for very many years in Northern Ireland to the entire satisfaction of the customers. An enquiry held by one firm showed that 85 per cent. of the customers preferred this system, for it meant less wasted time for housewives and maids. Where such a procedure is followed in peacetime the quality of the products must be of the best so that they will not stale rapidly. In wartime these considerations cannot hold when the order is general and materials are controlled, but the firm who make the best article will always hold the trade. With all such delivery restriction the public are well served, and they still have the freedom of purchasing fresh bread in the shops every day if they desire to do so.

Although we may think that we are fairly well controlled, there is still sufficient freedom of action allowed us to make restrictions far from being unduly irksome.

The Manufacture of National Bread

(*Continued from page 215*)

trouble. Details of this method have already been extensively published in most of the baking trade journals.

Mould has been responsible in the past for the loss of much brown bread during the summer months, but it is expected that the prohibition of slicing and wrapping will largely eliminate this form of wastage. To reduce the danger of mould development the bread should be cooled in as clean and as dust-free an atmosphere as possible.

In this article no mention has been made of the nutritional value of National bread, as the baker will find that the addition of 7 ozs. per sack of Creta præparata which the Ministry of Food has decided shall be added will not necessitate any alteration in his method of manufacture. It would be advisable, however, for such an addition to be postponed until after the summer is over as it certainly will not help to prevent trouble due to rope and may in some cases accentuate it. Moreover, as more milk is available during the summer, the addition of a calcium salt to bread is not so necessary during this time of the year.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in FOOD MANUFACTURE should not be taken as an indication that they are necessarily available for export.

Food Nomenclature in Wartime

This knotty question is discussed from various angles, but mainly from that of the public analyst. There are a number of points in connection with the names of foods and substitutes which require clarification, and indications are given as to how this might be done.

THOMAS MCLACHLAN, F.I.C.

A SUGGESTION was put forward in FOOD MANUFACTURE in August, 1941, that it is preferable for new products placed on the market to be given fresh titles rather than for inferior products to be described by names which have been household words for generations.

Results of Rationing

The full effects of wartime rationing in manufacture are now beginning to make themselves felt and it is possible to take stock of some of the results. Conditions with regard to certain articles became so appalling that the Minister of Food was obliged to take cognisance of the matter and to issue Regulations under Section 55 of the Defence (General) Regulations, 1939. As a result, Orders have been made which control the sale of substitutes, saccharin and starch, but the chief difficulty appears to lie in the definition of what is and what is not a substitute.

According to the Food Substitutes (Control) Order, 1941, a "food substitute" means any preparation or product offered or purporting to be capable of being used as a substitute for any food. Immediately before this definition the information is given that "food" has the meaning assigned to it in Section 100 of the Food and Drugs Act, 1938, and reference to the Food and Drugs Act informs us that "food" means any article used as food or drink for human consumption other than drugs or water, and includes:

(*a*) Any substance which is intended for use in the composition or preparation of food;
(*b*) any flavouring matter or condiment; and
(*c*) any colouring matter intended for use in food.

Infringement of Food Substitutes (Control) Order

If the full force of this combination is realised it will be seen at once that very many prepared foods on the market at the present time are definitely infringing the Food Substitutes (Control) Order. Many manufacturers are complaining bitterly of the action of Local Authorities when the latter state in advance what they expect to find in foods, and this feeling has found effect in two letters published recently in *Chemistry and Industry* over the names of De Giacomi and Warren. These writers, and others, feel that it is quite incorrect for Local Authorities to make any stipulations with regard to the composition of foods, because under the Food and Drugs Act the Minister of Health alone possesses these powers.

It is true that the Minister of Health alone has these powers in peacetime and that the Minister of Food has similar or rather stronger powers during the war, but it does not seem to be appreciated that there is a considerable difference between the standards put forward by a Minister and those suggested by a Local Authority. Any Regulations made by the Minister become law, and thenceforth it is the duty of good citizens to comply with the law and of magistrates to enforce it.

In contrast to this, any standards adopted by Local Authorities are merely standards which they propose to endeavour to enforce, and statements in advance that they expect to find certain qualities in specific articles enable the trade to discuss the matter and to arrange for a proper test action to be fought, if necessary.

If it is argued that these test actions may hit against a particular manufacturer, it may be pointed out that the case of "what is vinegar?" involved no publicity of the name of any manufacturer, although it was mentioned in court that the action was being financed by a trade organisation. The nominal defendant was simply a fish-and-chip vendor, but the Westminster authorities had issued a warning in advance that they proposed to take certain action and then did so.

What is a Substitute?

To revert, however, to the present time, it will be seen that if it is agreed that specific foods have recognised compositions, then any departure from these standards must force the food into the category of a substitute, and it will come within the purview of the Food Substitutes (Control) Order, and this means that it should be licensed.

Most manufacturers are anxious to avoid the stigma of marketing substitutes, but it is difficult to see why a solution of dulcin, citric acid and hydrated citronellal should constitute a lemon cordial, while an egg substitute powder has to be definitely controlled.

A very cursory glance at preparations of which the composition has changed completely since the outbreak of war shows us the following foods:

Custard and blancmange powders.
Egg substitute powders.
Milk substitute powders.
Cocoas.
Coffee essences.
Artificial creams.
Ice creams.
Essences.
Flavours.
Cordials.
Macaroni, sphaghetti, etc.
Sausages.
Spices.
Meat and fish rolls.
Meat and fish pastes.
Jams.
Jam tarts and puddings as served in restaurants.

Chocolate and other confectionery, including fudges, boiled sweets, etc.
Icing on cakes.
Mayonnaise and salad creams.
Wines and spirits.

If the public analyst objects he runs the risk of being thought hard by the manufacturer, and not only by the manufacturer but also by many members of the public. It is often said that the public does not know anything about nutrition when the wartime products are inferior in nutritional qualities to the pre-war article.

The Rôle of the Public Analyst

Surely it is for the public analyst to protect the public in this case, but this article is not concerned with nutritional values, etc.; it is concerned with the question of whether these things should be sold under their pre-war name or not. Many of the articles placed on the market at the present time are quite wholesome, but they are inferior in many respects to the pre-war article, and one has to consider whether they should be described by their pre-war title or by some other name, and whether, if they are permitted to be called by the pre-war title for the duration of the war, they will revert to their pre-war high standard when the war is over. In the author's submission, the claim that pre-war standards will come into force again is entirely fallacious, and in support of this statement mention need only be made of the case of cream buns, cream éclairs, etc., which were prepared with artificial cream during the last war and which have been largely made with the artificial product ever since, so much so that the confectioner who used fresh cream in his pastries had to resort to the custom of stating that they contained " fresh cream ".

A similar custom exists in this country where the pharmacist is usually known as a chemist, while the professional chemist has to employ some specific qualification to let the remainder of the public know that he is not a pharmacist, and then this public in its wisdom has become so accustomed to the meaning of the term " chemist " that it thinks a chemist who is not qualified to open a shop must be quite an inferior variety of chemist.

Degraded Foods

The composition of many foods has already been degraded considerably. One has only to think of lemon curd, which was formerly prepared with butter, eggs, lemons and sugar; mayonnaise, prepared with eggs, butter and cream; egg substitute powders, which have been recognised articles of commerce for some years, and other preparations, to wonder at what we may finally expect to be the composition of many of our present-day favourite dishes. A piece of wedding cake recently received at the author's laboratory was so different from what it was formerly that it was some time before the staff appreciated that it was a private gift and not a sample for chemical analysis. The cake was hardly worth eating, and the almond icing consisted chiefly of powdered groundnuts with a smattering of sugar, saccharin and benzaldehyde. Chocolate powders contain so much flour that they appear to infringe the Starch Control Order.

Claims are made that many of the recently introduced egg-substitute powders help the Ministry of Food to persuade the public to eat soya flour, which is good for their nutrition, but one wonders at times whether the soya flour has not been omitted by accident or design. Many mayonnaise creams contain no appreciable amount of oil or fat. Fish pastes are made with a herring base instead of the recognised salmon one, and complaints are received that bloater paste has been supplied for lobster or that bloater paste has been filled into anchovy paste jars. Gin is flavoured very artificially, vermouth is diluted with cheap sherry and probably something else, coffee essence is flavoured with vanillin, which seems to find its way into British brandy and also gin, so that one wonders exactly where one is.

Macaroni products should be prepared from *Triticum durum*, but are prepared from ordinary wartime flour, while in the restaurants one asks for jam roll and is served with a piece of pastry over which a coloured, sweetened and flavoured starch solution has been poured.

Flavouring Materials

Not all the difficulties with which one is confronted have arisen since the outbreak of the war. The question of the solvent used for essences was raised in Parliament a few years ago, when isopropyl alcohol was first employed. Since that time the glycols have also been pressed into service, and now it is quite a common custom to find emulsions sold as essences. Essence of lemon may consist of a good essence, prepared from terpeneless oil, an isopropyl alcohol or glycol solution, an emulsion and even a citric acid solution, to which a mere trace of odour has been added. The Ministry of Food has even added to the difficulty by instructing a preparation of the last-named type to be called an essence and not a substitute. When flavourings are considered one has to trust largely to the integrity of the manufacturers, and a special appeal is made to them to maintain the standard on account of the difficulty of obtaining sufficient of the sample to check the quantity of essential oil present in a product. If the public analyst can rely on more or less agreed standard preparations it will not be impossible to check inferior products, but at the present time one does not know what the public can honestly expect with many of these preparations. In a recent case in which the author was concerned it was suggested by the defending solicitor that any essence was a concentrated essence because it was concentrated into the bottle, and whilst the bench would not accept this explanation, they did require the public analyst to give a reason for his views on concentration, and most analysts would be grateful for information from the trade on this point.

Changing Names

One is asked not to trouble about these points as the manufacturer is already sufficiently harassed to get what ingredients he can to tickle the public palate, but is asked to go for those people who do not legitimately belong to the food trade. The reply to this suggestion is that it is quite a simple matter to change the names generally or to prefix the descriptive title with the word " war " in the same size letters as the remainder of the title—*e.g.*, War-Lemon Cordial, War-Macaroni, etc.—and we know where we are. Otherwise can the legitimate manufacturer complain of the poor fellow who

has lost his previous business and tries to go one better than those already established in the food industry?

The sooner that these little problems are settled the better for the peace of mind of all parties concerned—the public, the manufacturer and the public analyst. Many of the last-named are paid by fee per sample, and it is not in the interests of their pockets to report samples as adulterated and to have to support a lot of prosecutions. Local arrangements may be better than nothing, but in the main it is most desirable that the trade and the public health authorities should be agreed in their action; both are instituted to serve the public, and it is in the mutual interest of all that the public is served to the best of our ability if we are to win the war and to preserve a healthy race at the same time.

*p*H Control in the Dairy Industries

MANY of the properties of milk, such as the keeping quality, the rate of rennet and heat coagulation and incidence of coagulation by acid, depend among other things upon the salt content and the *p*H. Even the salt ions, which are important in these processes, are affected by the *p*H.

The growth of acid-forming bacteria results primarily in increase in titratable acid, which in turn causes an increase in hydrogen ion concentration. Due to interaction of the acid with the casein and salts of the milk, the changes in titratable acidity and hydrogen ion concentration are not proportional. Further, the practical interest in this connection is usually in the possibility of coagulation, which is determined, not by the titratable acidity but by the hydrogen ion concentration. Consequently, a determination of the *p*H of milk will more accurately give the desired information than will a determination of the titratable acidity.

It has been shown that a fairly definite relation exists between the *p*H and titratable acidity of fresh milk, so that if either is determined the other can be estimated with a fair degree of certainty. It has also been shown that a different relationship exists between the titratable acidity and *p*H of sour milk, by means of which fresh milk and sour milk can generally be distinguished even though the natural acidity and *p*H of the samples when fresh might vary through wide limits.

Acid Precipitation of Casein

The acid precipitation of casein from various milks takes place at a definite hydrogen ion concentration and not at a definite titratable acidity. Thus a determination of the *p*H is important in the commercial preparation of casein by the acid precipitation process. It is highly probable that the hydrogen ion concentration more nearly indicates the desirability of the milk for cheesemaking than does the titratable acidity which has been used in the past as a criterion. Van Dam[1] has found that the time of rennet coagulation increases linearly as the hydrogen ion concentration of the milk decreases. Sammis and Santschi[2] have called attention to the *p*H of the whey in cheesemaking. Benton and Albery[3] consider the hydrogen ion concentration of the milk of importance as influencing heat coagulation of evaporated milk. Sodium bicarbonate has frequently been used to decrease the coagulation in evaporated milk; it probably functions by increasing the *p*H.

Attention has been called to the relationship between the *p*H of milk and the alcohol coagulation test, and it is concluded that the *p*H of normal milk controls its alcohol coagulability. The *p*H of bacteriological culture media is usually of more importance than the titratable acidity. As milk is frequently used as a culture medium, a knowledge of its *p*H is desirable.

Colorimetric Determination of *p*H

A method has been described[4] for the colorimetric determination of the *p*H of milk and whey, based on the application of correction factors for the effect on the hydrogen ion concentration of diluting the milk or whey with 19 volumes of distilled water. The milk is diluted in order to reduce the turbidity to a point where it is possible for a strong light to pass through the solution. This method gives results which are usually correct to within 0·1 *p*H, the average error being plus or minus 0·06 *p*H. By using this solution the colour comparisons can easily be made by means of the comparator method.

The colorimetric method can be applied to raw and pasteurised whole and skim milk, rennet and acid whey, cream, dried milk, evaporated milk, and sweetened condensed milk.

Studies have been made of the ability of bacteria and enzymes to produce changes in the hydrogen ion concentration of milk. As these changes affect the keeping quality of the milk, tests have been developed whereby the keeping quality can be determined. The test involves adding 0·1 c.c. of the milk to be tested to a tube of broth containing bromthymol blue and incubating at 37 deg. C. *p*H readings are made hourly by comparison with colour standards, and the condition of the milk is judged by the rate of change. Such a test may require from one to eight hours.

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[2] Sammis and Santschi, *J. Dairy Sci.*, 7, p. 83.
[3] Benton and Albery, *J. Biol. Chem.*, 68, pp. 251-263.
[4] Sharp and McInerney, *J. Biol. Chem.*, 70, pp. 729-758.

Nickel in the Dairy

INVESTIGATIONS to determine, *inter alia*, (1) the stability of chlorine solutions when stored in open or closed containers, simulating conditions under which such solutions are usually stored in milk plants and on farms; (2) the corrosive effect of chlorine solution on different metals and alloys; and (3) the dissipation of available chlorine by metals and by milk, are reported by Haller, Grant and Babcock, in *Tech. Bull.* No. 756, of the U.S. Department of Agriculture.

According to an abstract in the *Nickel Bulletin* of January, the metals on which tests were made were: Aluminium alloys, black steel, tin, stainless steel (18/8), and nickel-chromium-iron alloy (Inconel-type), bronze, nickel, nickel silver (18 per cent. nickel), 70/30 cupro-

nickel, nickel-copper alloy (Monel-type), copper-nickel-zinc alloy (75/20/5 per cent.), copper, aluminium, phosphor bronze.

The chlorine solutions consisted of three widely used commercial mixtures: sodium hypochlorite, buffered sodium hypochlorite and chloramine T. (Typical analyses of the mixtures are given.)

Resistance to Dilute Chlorine Solutions

Each combination of metal and solution was contacted under three conditions: (1) Cleaned and weighed strips were placed in ½-pint bottles, which were capped, sealed and allowed to stand for fourteen days; (2) conditions similar to (1), except that the bottles were not sealed and the solution was renewed every twenty-four hours for a period of fourteen days; (3) test strips were placed in fresh chlorine solution for two hours daily, removed, and allowed to dry until the next day. The cycle was repeated for twelve days.

Later tests, designed to simulate more closely the conditions operative in dairy practice, consisted in the following cycle: Test strips were immersed in milk for thirty minutes at 145° F. (62° C.), removed, rinsed in water and cleaned by rubbing with a soft flannel; they were then immersed in the chlorine solution for thirty minutes at 77° F. (25° C.). On removal from the solution, the strips were drained and allowed to dry completely. The cycle was repeated thirty times.

Results of individual tests and data on tarnishing are shown in the report. The nickel-containing materials, particularly the nickel-chromium-iron types, showed consistently good resistance to attack.

In the corrosion experiments described, the strength of the solutions was determined before and after the immersion periods, to ascertain the degree of dissipation of chlorine caused by the respective metals. The results varied somewhat widely, the greatest loss of chlorine being found in contact with aluminium, copper-base alloys or steel. Under given conditions, the sodium hypochlorite solution suffered greater loss of chlorine than the chloramine T type. The high-nickel materials caused only slight chlorine dissipation.

Behaviour with Dilute Alkali

Test strips of the metals named above were placed in contact with solutions containing 0·3, 0·5 and 0·7 per cent. of sodium hydroxide, used at 30° C. (86° F.). The tests were carried out under conditions closely simulating those obtaining in regular treatment of milking machines, involving two immersion periods (five and a half hours and fifteen and a half hours respectively) in each twenty-four hours, with intermediate rinsing and drying. The test comprised thirty cycles.

Tables giving the results of the respective series of tests show that (1) the aluminium-base materials were so severely attacked as to render the materials worthless for structural purposes; (2) tin was considerably damaged by loss of surface metal; (3) copper and bronze were the only metals showing (slight) gain in weight; other copper alloys showed very slight losses of weight; all copper alloys showed varying degrees of discoloration; (4) nickel-chromium-iron suffered only a trace loss of weight and the 18/8 steel showed negligible loss in all strengths of the alkali solutions; (5) nickel underwent no change in the two weaker solutions and showed only negligible loss in the 0·7 per cent. concentration.

(*Through Chemical Trade Journal.*)

Beware Bureaucracy

THERE is a whole bag of beans, but Lord Perry chooses the traditional five for his indictment of bureaucracy.* His explanation of the title is "the tragedy of our time is that so much of our national life is governed and so many of our affairs are being conducted by men who obviously don't know how many beans make five. . . . The consistency and persistency of blundering administration is remarkable and, in existing circumstances, tragic. It may easily prove fatal to our success and survival."

In the matters of coupons and food prices, Lord Perry's criticisms are particularly mordant. With regard to the former he says, "No one but a bureaucrat secluded in his armchair in Whitehall, impatient of advice, inebriated by the powers conferred on him by the Emergency Powers (Defence) Act and lusting for the destruction of commercially established ways and means, could have formulated schemes whereby forty-odd millions of people should be required day after day to hand over little bits of paper in exchange for the food they purchased and paid for. . . . To arrange the coupons and prepare the books absorbed incredible hours of paper-makers' time, cargo space, transport space, printers' time, officials' time". Lord Perry elaborates this theme and suggests that a better way of apportioning the nation's stocks than those mad dreams of collecting millions of uncountable pieces of paper printed in two colours would be a system of "indent" based on the known allocations to traders, which is stated to have been substituted for the coupon for all purposes beyond the retailer's counter.

Lord Perry proceeds to discuss the system of registration and licensing. The shopkeeper, merchant and manufacturer may not use his premises, retain his customers, employ his capital or earn his living unless he is an approved person. One of the results of this is that premises which have been licensed for the sale of rationed goods have a market value greater than similar premises not so licensed. He does not agree that the licensing system will facilitate distribution, and argues "that all this conspiracy of formalities is unnecessary is proved by the fact that the tied-house system has not yet been applied to tea; proprietary teas are sold and may be bought from any small retail shop as in the Good Old Days, notwithstanding continual pressure from the planners to destroy proprietary brands of tea in the same way that bureaucracy has already destroyed proprietary brands of butter, margarine, and other commodities."

With reference to food prices, and the great problem of feeding the population, Lord Perry is of the opinion that difficult and complex as it may be it is still possible of performance by the ordinary principles and canons of sound business. The question posed is—when inevitable and unavoidable wartime costs have been allowed for, is the distribution of food burdened with other charges which are neither inevitable nor unavoidable?

Other chapters deal with food prices, purchase tax, income tax, and the payment of overtime.

* *How many Beans make Five?* Post-War Questions No. 17. Lord Perry. Pp. 46. 6d.

Blackplate Cans for Processed Foods

The first part of a series of articles on the use of blackplate for processed cans is a paper presented at the Annual Canners' Day at Campden in May. This subject is occupying the attention of many investigators both in this country and the U.S.A. and progress has already been made. Part II will give an account of the result of investigations up to date.

R. K. SANDERS, M.A.,

Research Department, The Metal Box Company, Limited.

Part I.

IN 1941 Great Britain and the United States together used 158,000 long tons of tin, and of that total Britain used 30,000 tons. Now, in 1942, with the Japanese in possession of the tin mines in Malaya, in the Dutch East Indies, and in Burma, the total amount of tin annually available to the Democracies is only 85,000 tons. This means that since Russia and China are both to be supplied with tin as well as Britain and America all the Allied nations will have to cut down their consumption of tin by more than half, and, although the problem of making processed food cans without the use of tin is a very difficult one, and we are still allowed to use tinplate for these cans, we shall in all probability be compelled, before we are very much older, to use a great deal less tin in the manufacture of food cans than we have used hitherto; for there are now a vast number of essential munitions made from tinplate and solder on which no economy of tin can be effected.

It is possible, of course, that a shortage of steel in the Allied countries may result, as it is reported to have done already in America, in a wholesale prohibition by the British Government of the use of steel plate in any form for the packing of a large number of ordinary commercial products, and that canned foods may eventually be included in such an embargo. However, for the time being at any rate, steel is available, and we must continue to direct our efforts towards the saving of tin—which is not.

Functions of Tin in Cans

Tin is used in the manufacture of food cans:

(i) as a protective coating on the surface of the steel plate, and

(ii) as a constituent of the solder used in sealing the side seams.

The functions of the tin on tinplate used for the manufacture of food cans are:

(i) To protect the steel plate against corrosion by the atmosphere before, during and after its fabrication into cans, and against corrosion by the contents of the cans made from it.

(ii) To facilitate the soldering of the side seams.

(iii) To act as a lubricant for the steel plate as it passes through the machines that make it into cans. This function is a very important one, but its importance was not fully appreciated until attempts were made to make can components in large quantities out of unlacquered steel plate, when it was found that the lives of press tools and certain body-maker parts were reduced to less than one-tenth of their normal length by the high frictional forces operating between steel plate and steel machine parts.

How Tin Prevents Corrosion

The mechanism whereby tin protects steel against corrosion is perhaps not yet fully understood, but, as a broad generalisation, it is safe to say that under external atmospheric conditions and under the conditions prevailing inside cans of non-acid products like meat, fish, soups or vegetables, tin is cathodic to iron and protects it merely by covering it up, and therefore protects it more effectively the more thoroughly it covers it. Under the conditions prevailing inside a fruit can, however, tin is now believed to exert its protective influence mainly by dissolving in the corrosive liquid inside the can and in the dissolved state inhibiting, in some way not fully understood, the attack upon exposed steel.

It is well to have these broad generalisations in mind when we consider in what directions we may most profitably look for a means of economising tin in the manufacure of food cans.

Reduction of Tin on Plate

A substantial reduction in the weight of tin coating used, coupled with the universal application of lacquer both internally and externally to cover up the greatly increased porosity from which very low tin coatings suffer, is of course the first suggestion that presents itself. However, with very light tin coatings high-speed soldering becomes so difficult as to be almost impossible, and this difficulty also applies to thin coatings deposited electrolytically.

Experimental work is in progress on both the production and the soldering of lightly coated electro-tinned sheet, but it is unlikely that, even granted a successful issue out of the technical difficulties, we shall be making cans from electrically tinned sheets in less than eighteen months' time, for the problem of electro-tinning sheet as opposed to strip is a difficult one, and a very great deal of expensive machinery will have to be built if a large amount of plate is to be produced.

Replacement of Tin by other Means

The next thought in logical sequence is the use of some other metal with protective properties similar to those of tin. Apart from zinc and copper, which are

poisonous and therefore useless for food cans, only nickel and silver have been considered. Nickel, however, though doubtless possessing the necessary protective properties, is a munitions metal, and is moreover too inflexible for fabrication into can ends and too difficult to solder to be made into can bodies. Little is known about the properties of silver-coated steel, for it has not hitherto been a commercial product, but, although technically it might be entirely acceptable, it is very doubtful whether anything like adequate quantities of silver would be available.

In the absence of suitable metallic coatings, our thoughts turn to the possibility of using uncoated steel rendered non-corrodable by the formation of some passive phosphate, chromate, oxide or oxalate coating, as in the well-known Bonderising and Parkerising processes in which the films formed are phosphates.

The Bonderising process will be considered in a little detail later, but at present it is sufficient to say that none of these chemical surface treatments will, unaided, confer sufficient resistance to corrosion for plate so treated to be suitable for food can manufacture without further protection. Some of the processes—Bonderising, for instance—form excellent undercoatings for lacquer films, but none is adequate in itself. In any case, there is as yet no equipment in this country for producing on steel sheets a Bonderised film suitable for fabrication into cans.

Untinned Steel Plate

Finally, then, we turn to lacquering untinned untreated steel plate as our only immediate hope of saving tin on tinplate for food cans.

In the absence of tin or some other corrosion-inhibiting film under the lacquer the successful use of lacquered blackplate will clearly depend on obtaining, as nearly as possible, perfect coverage of the steel by a film of impervious lacquer. Perfection in this respect is a goal that has not yet been reached, and as it was thought that the effects of imperfect coverage were more likely to be prohibitively serious with acid products than with non-acid ones, the first products to be considered as candidates for blackplate cans have been meats, fish, soups and vegetables.

As soldering of blackplate with non-corrosive fluxes was known to be very difficult at high speeds, first efforts have been aimed exclusively at producing blackplate ends.

Before describing the work going on along these lines it would be as well at this stage to understand quite clearly what blackplate is.

What Blackplate Is

Tinplate is produced in this country by two methods. In one (by which about two-thirds of our plate is made) all rolling from bar to sheet is done hot and in packs, and in order to prevent the sheets from welding together while they are hot a high content of metalloid impurities (most notably phosphorus) is essential. In the other process most of the rolling is done in the cold and all of it is done in continuous strip, which allows low metalloid steel with high resistance to corrosion by acids to be used. These two types of steel, hot rolled and cold rolled, are well known in the form of tinplate, and since blackplate is essentially tinplate before it is tinned, the two types of steel plate with their relative advantages and disadvantages still confront us when we turn from tinplate to blackplate.

In the course of its manufacture into tinplate by the hot rolling process, steel plate receives two annealing treatments, and as it cools down from the annealing furnaces the atmosphere has access to it—at any rate at the edges—and forms on it a blue film of iron oxide. Our first discovery about the use of blackplate was that in this oxidised condition it is quite useless for the manufacture of can ends, since when it is stamped into ends the oxide film flakes off, and with it comes the lacquer.

It so happens that in the only cold-reducing tinmill in England both the annealing and the cooling are carried out in large chambers from which air is excluded by the ingress of purified coke-oven gas, and the blackplate made by this process is, of course, entirely free from oxide film. This "white-to-edge" blackplate is, however, in very great demand, and perhaps the main problem still facing the tinplate industry as a whole is that of producing white-to-edge plate in the hot-rolling mills. Some mills will be able to install equipment for cooling in an inert atmosphere, but their output will be very limited, and, in conseqeunce, a deal of work is being done at the moment to produce white-to-edge plate by pickling off the oxide film and then preventing the rusting which would normally follow the exposure of pickled plate to the atmosphere, either by some mild passivation of the surface by a chromate or phosphate immersion treatment or by the immediate application of thin films of oil.

First Experiments with Blackplate

The first experimental blackplate ends for food cans were made by simply lacquering plate in the flat sheet with the lacquers in common use for meat and vegetable packs. Ends made from both hot- and cold-rolled white-to-edge plate, lacquered both inside and outside in the flat sheet, have been the subject for some three or four months now of fairly large-scale packing tests. The general indications from the openings which have been made up to now of tinplate cans with these blackplate ends are that blistering and peeling of the lacuqer and staining of the plate are more severe on blackplate than on tinplate. Internal rusting, which is very rare in lacquered tinplate cans, is also comparatively common both under the lacquer film and at points where it has been fractured. With solid meat packs, however, and those with no head space generally, the appearance of the ends made of either type of steel is quite acceptable when they are coated with a single film of meat lacquer in the flat sheet. The quality, appearance and flavour of all the packs is quite normal, though the iron content is considerably higher than that usually found in tinplate cans.

The lacquer on the outside of a roller-coated end is inevitably severely damaged at the expansion rings, at the double seam, and as a result of handling while it is still soft from the retort, and blackplate ends so lacquered are consequently very liable to severe rusting. It might therefore be necessary for all such ends to be lacquered again after the cans are processed.

Dip-Lacquering

It was anticipated from the beginning, for the reasons already mentioned, that for some packs, par-

ticularly certain meat products, it might be necessary to cover up by dip-lacquering the metal inevitably exposed on an open-top end during the course of its manufacture. Packing tests were accordingly put in hand with experimentally dip-lacquered ends at the same time as were those mentioned above on roller-coated ends. The present indications after two months' storage are that these dip-lacquered ends are greatly superior to the roller-coated ones both internally and externally, and that they will probably be entirely suitable for all meat and vegetable packs. It is even possible that for all but the most severe storage conditions they may not require additional external lacquering after processing.

In spite of the apprehensions already expressed about the improbability of blackplate ends being suitable for acid products, some large-scale experiments on the packing of jam in cans with roller-coated blackplate ends have been put in hand, and at present there is every indication that they will be entirely suitable.

Many problems have arisen in the designing and development of automatic plant to dip-lacquer ends at a speed consistent with modern can production rates, but most of these are now overcome, and if there is a demand for dip-lacquered blackplate ends it will probably be possible to produce them in limited commercial quantities within about six months from the date of decision that they will be wanted.

The Bonderising Treatment

The chemical treatment known as Bonderising, which consists in forming a thin film of a metallic phosphate on the surface of the plate, has already been mentioned. This process has been in very common use in the motor-car trade for many years. The function of the phosphate film is twofold: first to afford better anchorage for a lacquer or enamel film and, second, should that film get damaged, to prevent the spread of rusting or other corrosion under the lacquer film from the point of fracture. It is claimed in America that this additional protection given by the phosphate film will be essential if lacquered blackplate is to be used successfully for processed food cans, but unfortunately no plant is available in this country for obtaining on sheets of blackplate a Bonderised film of grain structure fine enough to permit of ends being stamped without the film being fractured.

The necessary plant is almost fully developed in America and the fullest possible information about it is being obtained, but it is estimated that large-scale plant cannot be installed and production difficulties overcome in this country in less than about eighteen months. However, a small supply of Banderised plate suitable for can making has recently been received from America, and roller-coated ends have been prepared from it and packing tests similar to those already described are in progress. It is hoped that the presence of the phosphate film will eliminate the necessity for dip-lacquering either before or after packing.

Prospects for Blackplate Cans

It only remains now to say a few words about the prospects of eventually making processed food cans with bodies as well as ends made of blackplate.

Soldering blackplate on high-speed machines is a difficult business with any flux, but with a flux which will not subsequently lead to corrosion it is as yet impossible, nor has any means yet been found of effectively cleaning off the flux residues or of preventing the corrosion in some other way.

It is unlikely that any dope will be found capable of sealing the lap portions of open-top can side seams to form joints effectively resistant to internal pressures in the presence of steam at high temperatures, although there is no doubt that blackplate cans with doped seams will very shortly be in use for jam and other non-processed foods.

All efforts, therefore, are being directed towards attempting to apply a coating of tin to the blackplate only on those narrow strips which are subsequently to be soldered in the side seams.

This work is not yet very far advanced, and it will be many months before any large-scale automatic means can be developed, but it might be of interest to know that the methods under consideration apart from electrolytic means, which will be investigated along with the general development of electrolytic tinning of sheets already mentioned, are:

(i) The immersion of the edges of blanks in a corrosive flux to the depth required for soldering, followed by immersion to a greater depth in a bath of molten tin or solder. Excess flux can be dissipated in this way and excess tin can be wiped off by rotating mops.

(ii) Lacquers are being developed to resist being passed through a tinning pot. If such lacquers are applied to blackplate sheets, leaving plain stencils where soldering is subsequently to take place, the lacquered sheets can be passed through pickling tanks and tinning pots in the normal course of tinplate practice and emerge tinned only on the strips left unlacquered.

(iii) Bonderised plate is said to resist tinning, and experiments will shortly be under way on the possibility of removing the phosphate film in strips by either mechanical or chemical means, and tinning the plate as already described.

In addition to the problems involved in soldering side seams, the use of blackplate for bodies introduces protection problems just as it does for ends, and the space and equipment required for post-lacquering bodies is very much greater than that required for the comparatively simple process of dip-lacquering ends. If the application of Bonderising referred to above can be realised, production of blackplate cans for processed foods will probably be quite simple even on a very large scale, and if Bonderising fails in this respect, then all blackplate bodies for processed foods will have to be lacquered after fabrication by either flushing or dipping, and in that event production will inevitably be reduced to a very low rate.

Correction

The National Bread

THERE was a printer's error at the end of the third paragraph (page 197) of Mr. F. H. Fairbrother's letter in the July issue. Instead of "Changes in diet do manifest their results very rapidly", the sentence should, of course, read "*Changes in diet do not manifest their results very rapidly*".

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, July 1, page 200.

PRICE FIXATION ORDERS

No.	*Date.* 1942.	
545	Mar. 23.	Amending the Jam (Maximum Prices) (No. 2) Order, 1941.
558	,, 25.	Nuts (Control and Maximum Prices) Order, 1942. Revokes S.R. & O. 1941 Nos. 120, 345, 534, 1289 and 1290, and 1942 No. 257.
559	,, 25.	Amending the Vegetables and Vegetable Products (Canning, Bottling and Freezing) (Control and Maximum Prices) Order, 1942.
561	,, 25.	Chocolate. Couverture (Maximum Prices) Order, 1942. (1939 No. 927. Reg. 55.)
562	,, 25.	Amending the Imported Canned Fish (Maximum Prices) Order, 1941, and revoking the Canned Sardines (Maximum Prices) Order, 1941. Revokes S.R. & O. 1941 No. 671.
569	,, 25.	Amending the Pepper (Control and Maximum Prices) Order, 1941.
581	,, 26.	Honey (Maximum Prices) Order, 1942. Revokes S.R. & O. 1941 No. 1242.
582	,, 26.	General Licence under the Fruit (Canning, Bottling and Freezing) (Control and Maximum Prices) Order, 1942. (1942 No. 87.)
584	,, 28.	Amending the Dripping (Maximum Prices) Order, 1940.
585	,, 28.	Amending the Fish (Maximum Prices) Order, 1942.
586	,, 28.	Amending the Feeding Stuffs (Maximum Prices) Order, 1941.
594	,, 26.	Pickles and Sauces (Control and Maximum Prices) Order, 1942.
608	,, 31.	Green Onions (Maximum Prices) (Northern Ireland) Order, 1942.
645	Apr. 4.	General Licence under the Dried Fruits (Control and Maximum Prices) Order, 1942, and the Nuts (Control and Maximum Prices) Order, 1942.
678	,, 9.	The Biscuits (Maximum Retail Prices) Order, 1942.
714	,, 15.	Amending the Marmalade (Maximum Prices) (No. 2) Order, 1941, and the Jam (Maximum Prices) (No. 2) Order, 1941.
725	,, 17.	General Licence under the Bread (Control and Maximum Prices) Order, 1941. (1941 No. 1542.) Revokes S.R. & O. 1942 No. 416.

CEREALS

No.	*Date.* 1942.	
652	Apr. 4.	Amending the Rice (Control) Order, 1942.
788	,, 28.	Amending the Starch and Dextrine (Control) Order, 1941.
789	,, 28.	Amending the Home Grown Wheat (Control and Prices) Order, 1941.

FEEDING STUFFS

749	Apr. 21.	Directions under the Feeding Stuffs (Rationing) Order, 1942. (1942 No. 156.) (Distillers' wet grains.)

GENERAL

646	Apr. 4.	Amending the Rationing Order, 1939, and the Preserves (Rationing) Order, 1941. (Rationing of Traders.)
647	,, 4.	Directions under the Rationing Order, 1939, and the Preserves (Rationing) Order, 1941. (Sugar.)
650	,, 4.	Tea (Rationing) Order, 1942. Revokes S.R. & O. 1940 No. 1181 and 1941 Nos. 16, 964, 1635 and 1825, and 1942 No. 111.
653	,, 4.	Directions under the Food Transport Order, 1942 (1941 No. 1694.) (Potatoes.)
708	,, 14.	Directions, 1942. (Port Talbot.)
807	,, 30.	Ministers of the Crown (Minister of Food) Order in Council, 1942. (Ministers of the Crown (Emergency Appointments) Act, 1939.)

MEAT

762	Apr. 23.	Canned Corned Meat (Prohibition of Sales) Order, 1942. (Details of Stocks required.)

POINTS RATIONING

648	Apr. 4.	Food (Points Rationing) Order, 1942. Revokes S.R. & O. 1941 Nos. 1718, 1808, 1823, 1921, 2015 and 2138, and 1942 Nos. 130, 219, 315 and 417.
649	,, 4.	General Licence under the Food (Points Rationing) Order, 1942. (1942 No. 648.)

SOAP

651	Apr. 4.	Amending the Soap (Licensing of Manufacturers and Rationing) Order, 1942. (1939 No. 927. Reg. 55.)

News from the Industry

MINISTRY NEWS

Ice Cream Ban

The manufacture of ice cream will be prohibited after September 30.

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Canned Macaroni Products

The canning of spaghetti and macaroni and of vegetable salad with mayonnaise is soon to be stopped.

* * *

Soya Bean Products

Under a new Order the maximum price of soya bean by-products was from July 1 £6 a ton net excluding sacks, and £6 15s. a ton gross including sacks if containing not more than 33 per cent. of fibre, and £4 10s. and £5 5s. respectively if containing more than 33 per cent. of fibre.

The Order also fixes a maximum price of £13 5s. per ton net for wheat screenings produced in the course of manufacturing cereal breakfast foods.

* * *

Stay-at-Home Holidays: Food Supplies

As recently announced in Parliament, the Ministry of Food is anxious to assist so far as possible in making supplies of food available at entertainments organised by Local Authorities in connection with the Stay-at-Home Holidays Campaign.

While no additional food can be made available to the catering trade as a whole for these purposes, Local Authorities organising holiday weeks may arrange for the supplies of food, which would normally be going to works canteens, British restaurants, or other catering establishments to feed workers at their work, to be used instead during the holiday weeks for the service of light refreshments in parks and other suitable places.

The provision of these refreshments may be undertaken by the works canteens or British restaurants themselves, or, alternatively, supplies may be transferred from these establishments to other caterers who are willing to undertake the job.

Wart Disease of Potatoes Order of 1941

In view of present conditions, a general licence has been issued authorising the planting or sale for planting in 1943 within the Protected Area of any Class I (English once-grown) potatoes grown within that area, notwithstanding that they are not certified as required under the Order. The licence does not authorise the planting in land on which Wart Disease has occurred at any time of any potatoes which are not of an approved immune variety. This early notice is given in order that merchants and growers may make their plans for next year's planting in good time.

* * *

Food Substitutes

When consideration was given to the report of the public analyst at a meeting of the Cardiff Public Health Committee, Mr. James Griffiths, who presided, said that all substitute foods ought to be analysed before they were sold.

Mr. D. T. Williams agreed, adding that some manufacturers did not mind paying heavy fines, for they made "a lot of money" before the authorities could stop them trading.

The Chairman: If it was not for the food inspectors some of us would be poisoned.

* * *

Food Hoarding

A fine totalling £125, with 30 guineas costs, was imposed at Leicester on a defendant for acquiring excess food, obtaining rationed goods other than by rationed documents, and refusing to furnish information to the Ministry of Food regarding the goods in question. It was stated that when Ministry of Food officials visited the cellar of a sixteen-roomed Leicester house they discovered 141 lbs. of sugar, 46½ lbs. of tea, 19 lbs. of coffee, 543 tins of fish, fruit, meat, soup, and milk, and three picnic hams weighing 22½ lbs.

Carrot Prices

The Minister of Food has made an Order prescribing a maximum price for carrots of the 1942 crop for England and Wales of 4½d. a lb. from July 6 to July 12, and 3½d. from July 13 onwards.

* * *

Raw Vegetables for School Children

The Board of Education has informed local education authorities that, owing to the shortage of fruit, school meals should include a helping of raw vegetables, if possible every day.

They advise helpings of about 1 oz. of salad or sliced vegetables two or three times a week, and to increase the amount gradually to 2 to 3 ozs.

* * *

Closed Bacon Factories

Bacon factories closed under the concentration scheme will retain their licences to produce bacon. When the concentration scheme is withdrawn they will therefore be in the same position as factories which continue in production, states Mr. Mabane, Parliamentary Secretary to the Ministry of Food, in a written reply to a question in the House of Commons.

* * *

Production and Sale of Rye Bread

A new General Licence came into force on June 29 authorising the manufacture of rye bread.

The Licence also authorises any person to sell or buy rye bread at prices exceeding the maximum prices applicable under the Bread (Control and Maximum Prices) Order, provided that at the time of sale the seller has available for sale National wheatmeal bread.

For the purposes of this Licence, "rye bread" means bread in which rye flour or rye meal constitutes not less than 25 per cent. of the total flour content. At least 75 per cent. of the wheat flour content of the bread must be of not less than 85 per cent. extraction.

OBITUARY

Sir Daniel Hall, F.R.S.

We regret to record the death of Sir Daniel Hall, D.Sc., F.R.S., which took place in London on July 5.

Being convinced of the necessity of applying scientific methods to farming, Wye College was started in 1894, with the support of the late E. J. Halsey, chairman of the Surrey County Council, and the work done there went far to remove the hostility of farmers towards scientific methods.

It was in 1902 that he went to Rothamsted and recognised the necessity for investigations by a group of workers. Application to the Board of Agriculture for a grant for agricultural research was unavailing, but help was forthcoming from the late Mr. James Mason and the Goldsmiths' Company. In 1905 Hall published the field results of Lawes and Gilbert in *The Rothamsted Experiments*. Hall did not confine himself to the laboratory, and accounts of his visits to farms, made in 1910, 1911 and 1912, were published in a series of articles in *The Times*, which were later embodied in his book, *A Pilgrimage of British Farming*.

In 1909 Hall became first a member and then the leader of the Development Commission, and in 1912 became permanent adviser, which involved relinquishing Rothamsted. In the meantime the Government's attitude towards agricultural research had changed, and Hall organised a system of agricultural education and advisory service, which is now admitted to be one of the best in the world.

His last book, *Reconstruction and the Land*, was published last year; in this he discussed how science may have full scope in the future of British agriculture.

One of brilliant attainment in the subject he made his own, Hall had many other interests. He was a brilliant florist, and also collaborated with W. B. Crane in the production of *The Apple*, a standard work. He was created a K.C.B. in 1918.

* * *

Sir James Curtis

Sir James Curtis, K.B.E., D.L., J.P., Adviser on Divisional and Local Organisation to the Ministry of Food, who died on June 29, joined the Ministry as a Divisional Food Officer in the Midland Division on the outbreak of war, resigning that post on January 31, 1941. He became Adviser on Divisional and Local Organisation on February 1, 1941, which post he held until the date of his death. He was Divisional Food Commissioner, Birmingham, from 1917-1921, and held various public appointments.

* * *

Mr. John Martin

Death has occurred in Glasgow of Mr. John Martin, who for the past forty years was secretary of the Glasgow Corn Trade Association. He was 79 years of age, conducted the flour-importing business of J. R. Lamb and Co., and was widely known and respected in corn trade circles. From 1915 he acted as secretary of the Corn Trade Benevolent Association.

* * *

Mr. Wm. Knight

We regret to inform his many friends in the trade that Mr. Wm. Knight passed peacefully away on Saturday, June 13, in his eightieth year.

Since 1920 he travelled for essences, covering, at one time or another, the whole of the British Isles, from as far north as the Orkney and Shetland Islands to the extreme south of England, and the whole of Ireland, both north and south.

He was a traveller of the old school and had practically retired some six years ago, although he continued to call on some of his older friends in the trade, but at the outbreak of war, when Mr. Macdonald, his successor, joined H.M. forces, he willingly volunteered to take over his work again.

Apart from his services as a representative, his firm, Cumming Parsons, Ltd., feel that they have lost a very old friend.

Food Value Calculator

Designed to simplify the usually arduous work of evaluating family and institution diets in terms of the main nutrients, including protein, vitamins A, B_1 and C, and the mineral elements, calcium and iron, is a food value calculator recently produced. Calorific values are also given. Most common foods have been classified into nine groups—namely, milk, butter, cheese, eggs, meat, fish, vegetables, fruit and bread.

It consists of concentric cards, the smaller pivoting on the larger. Through slits in the smaller card are seen, by revolving it, the amount of the particular food eaten, and immediately underneath this appear figures for the different food constituents contained therein.

It is the best attempt at arriving at essential data that we have seen up to date, and should prove of great help to the worker on large-scale dietary surveys. For the worker who has only occasional need to evaluate diets it will save much of the time and labour often taken up in extracting the required information from a wide collection of possibly unfamiliar sources.

In view of the fact that it will be used constantly, it is a pity that owing to present conditions it has only been possible to make it of cardboard. A more permanent material would have been preferable.

The calculator was worked out at the research laboratories of Vitamins, Ltd., who supply it.

* * *

Mr. H. J. Heinz

Mr. H. J. Heinz, the American food expert, has arrived in England by aeroplane to discuss food questions with members of the Government.

Lard Importers' Organisation

The formation of Lard Importers' Association, as a company limited by guarantee without share capital, is announced in Jordan's Daily Register of New Companies. The Minister of Food has the right to appoint not more than two members of the council which at the time of its inception numbered ten.

* * *

Health and Pensions Insurance Cards

New Health and Pensions Insurance cards came into use the first week in July, and employers and employees are reminded to read the instructions on the back as well as the front of the card. As an economy measure, the new cards cover a whole year's contributions, except in the case of juveniles, who will again hand in a half-yearly card. Trouble for the employer and loss of benefit for the worker may ensue from incorrect stamping. A scrutiny of the card, however, may at least reassure employers that they have been fulfilling Health and Pensions Insurance regulations, but they may not have realised that they are specifically required to stamp cards "not later than the time at which wages are paid". Also, now that olders workers are more in evidence, employers will find themselves usefully reminded that a special card must be stamped for a woman aged 60 and a man aged 65, and only the employer's contribution (9d. and 1s. respectively) is payable.

As for the employees themselves, not only will close attention to the instructions on their cards safeguard valuable and varied benefit rights, but they are soundly advised to join an Approved Society, if they have not already done so, though they are precluded during the war from transferring from one Approved Society to another. It may be added that insured men and women remain insurable by reason of service in the Navy, Army, Air Force or Women's Auxiliary Forces, and they should hand their Health and Pensions card to the authorities on enlistment. They, too, can join an Approved Society if not already a member of another.

New Canned "Butter" for U.S.A. Troops

Canned "butter", especially processed so that it can be stored without refrigeration, is the newest food item developed for use of American troops abroad, the U.S. War Department announces. Thus far some 10,000 lbs. have been sent overseas.

Strictly speaking, it is more a spread than a butter, and is officially known as "Carter Spread", in honour of Lieutenant-Colonel Robert F. Carter, Quartermaster-General's Office in Washington.

Prior to its use as a regular overseas food item, the spread was under test for six months at the Quartermaster Corps Subsistence Laboratory in Chicago. During this time it was placed on radiators and heated over a hot fire and yet maintained its solid form. The product is compactly packed in enamel-lined 1-lb. and 2-lb. tin cans, hermetically sealed. The cans are exported in suitable boxes, 24 or 48 cans to the case.

According to Quartermaster Corps specifications, the spread "shall be prepared from butter amplified or modified by the addition of a harder fat to bring the melting point of the finished product to approximately 110° F." This fat must be made of hydrogenated cottonseed oil flakes. The finished product presents a smooth, uniform consistency and appearance.

* * *

New Book on Vitamins

Of interest to workers on vitamins will be the news that supplies of Dr. Rosenberg's *Chemistry and Physiology of the Vitamins*, a comprehensive treatise of all the vitamins, is now available in this country. The complete literature of the field is critically surveyed, and the 700 pages of text are amply illustrated and documented. This volume is published by the Interscience Publishers, Inc., New York, and will be handled by the Imperia Book Co., Ltd., in London. The international interchange of the latest results of scientific research is an activity which, within the limits of national safety, should not be allowed to cease for lack of encouragement, and the activities of the concerns above-named should be of interest to the scientists.

Watch on Pilferers

"A food thief is as great an enemy as a Nazi spy," declares a note in the official organ of the Transport and General Workers' Union, appealing to members of the Union to assist in stamping out the growing menace of pilfering. If the evil is allowed to spread, the reputation of members will suffer from the depredations of ne'er-do-wells who have found jobs in the industry, and gangs operating in this new and profitable field, and the Union journal appeals confidently to members to do their utmost to stop this evil, for the sake of their own livelihood after the war and for the sake of the national well-being now.

Drivers are urged to take all precautions for the safety of their loads by leaving them unattended as infrequently as possible, by locking and immobilising vehicles, and by insisting wherever possible that deliveries are accepted by a responsible adult.

The special wartime problems to which the increase of pilfering is attributable, such as staff difficulties, inadequate packing, unsubstantial containers, unlocked doors for fire prevention, etc., will be hard to surmount, despite greater care, heavier penalties, and so on; but this timely endeavour to enlist the active co-operation of drivers in dealing with this serious problem of pilfering should have its measure of success, and will be welcomed by the food industries in their own and in the national interests.

* * *

Changes in Divisional Food Organisation

Sir Eyre Gordon, C.S.I., C.I.E., has been appointed Divisional Food Officer for the South-Eastern Division following on Mr. J. R. P. Postlethwaite's transfer as Divisional Food Officer to the London Division.

Sir Eyre Gordon is 58 years of age. He took his degree at Queen's College, Oxford, and entered the Indian Civil Service in 1908. During his thirty-four years in the Indian Service he was Chairman of the Federal Public Services Commission, 1936-1942, and member of the Executive Council of the Central Provinces, 1933-1936.

Fruit or Vegetable ?

A fruit and vegetable dealer in a suburb of New York was recently cleared of a charge of selling vegetables on Sunday. His defence was the following definition from Webster's Dictionary: "Tomato—a plant of the nightshade family cultivated for its fleshy fruit". The magistrate in dismissing the case gave legal status to a product that for long "has been in dispute as to whether it is fruit or vegetable".

* * *

Lactic Casein Imports

The Lactic Casein Importers' Association has been registered as a company limited by guarantee, without share capital, to co-operate with the Ministry of Supply or other authority in the allocation and distribution in the U.K. of lactic casein and other agreed products.

The first members of the Management Committee are: Messrs. Wm. H. Cummings (director of Nathan's Sales), Hy. C. Dutton (director of Casein Industries), Sidney H. Seabrooks (director of Sampson and White) and Sidney G. Tomkins (director of Guesdon and Co.). Mr. Cummings is chairman. The registered office is at 19, Fitzjames-avenue, East Croydon, Surrey.

* * *

Mystery Meat Deal

A man who sold more than 20,000 tins of meat roll and then disappeared was mentioned in a recent prosecution at Edinburgh Sheriff Court. It was alleged that a meat supply company had sold meat roll containing horseflesh for human consumption.

The firm, it was stated, bought the consignment from a man who had brought the meat to Waverley Station, Edinburgh. Since then contact with the man, who had given a London address, had been lost.

For the firm, the court was told that the manufacturers of the meat, who had since closed down, said they had not supplied the man in question.

Fines totalling £120 were imposed.

British Timken Staff

Mr. C. D. R. Tuckey, Assistant Works Manager, British Timken, Ltd., Aston Works, has been appointed Works Manager of another Timken works.

Mr. H. K. B. Glassey has been appointed Assistant Works Manager at Aston.

Mr. J. T. Emmerton of the bearing design department takes Mr. Glassey's former place in charge of Planning.

* * *

Mr. K. Bohemen

Mr. K. Bohemen, a director of Polak and Schwarz (England), Ltd., has recently joined the Netherlands Forces now stationed in Great Britain. Mr. S. R. Mansfield will continue the conduct of the affairs of the company during the absence of Mr. Bohemen.

* * *

New Provitamin A

Dr. Norris D. Embree, at the Memphis meeting of the American Chemical Society, announced the discovery of a new precursor to vitamin A. The substance was found during a research study on whale liver oil conducted by himself and Edgar M. Shantz at the Laboratories of Distillation Products, Inc., Rochester, N.Y. The new provitamin has been called Kitol. It is unique in two respects, in both of which it is diametrically different from carotene, the best known provitamin A.

Carotene is biologically potent, being converted by the animal body into vitamin A; but attempts to bring about this change in the laboratory have failed. Kitol, on the other hand, is biologically inactive but can be converted into vitamin A simply by heating to 500° F. in a molecular still.

This special still is needed to remove the vitamin A as soon as it is formed, since it would otherwise decompose at such a high temperature. It is the first precursor to be converted to vitamin A in the laboratory, and, in this sense, the decomposition product of kitol is a synthetic vitamin A.

Kitol, which occurs most plentifully in whale liver oil, is found in all other liver oils except those from certain freshwater fish. These oils, which contain, not vitamin A, but a related substance called vitamin A_2, contain instead of kitol an analogous compound named kitol$_2$, which on heating yields vitamin A_2.

* * *

Ninety Tons of Bad Food

Nearly 90 tons of foodstuffs were condemned at Manchester Smithfield Market during April, states a report to the City Council. The food included 25 tons of meat, nearly 9 tons of fish, 15 cwt. of fruit (including 6 cwt. of oranges), 49 tons of vegetables, 2 tons of tinned milk, and 1 ton of canned meat. More than 6 cwt. of other foods, including jam, together with hundreds of head of poultry and rabbits, were also found to be bad.

* * *

Beet Sugar Production

The 1942 crop of sugar beet in Scotland will be double that of 1941, it was disclosed by Mr. J. M'Cloy, managing director of the British Sugar Beet Corporation's Prestonhall factory at Cupar, Fife. Last year 7,000 acres were grown in Scotland, and this year that had been increased to 14,000 acres. The output from the Corporation's factories last year had been equal to the domestic sugar ration for the country, leaving only the sugar for manufacturing purposes to be brought from abroad.

With the sugar ration stationary, the added output expected from a doubled acreage must represent a very welcome addition to imports and a saving of shipping space.

British Oil and Cake Mills

Mr. Norman C. Ferrier (manager of Pearson Beckitt and Co., Glasgow branch of British Oil and Cake Mills) has been appointed a director of British Oil and Cake Mills.

* * *

It Does Pay

Ministry of Food officials have proved for themselves the truth that lies behind the title of a once record-breaking play, "It Pays to Advertise". If they had not embarked on a nation-wide newspaper advertising campaign to bring home "Food Facts" to the housewife they would have had to adopt the alternative of issuing leaflets wholesale throughout the country and establishing guidance centres staffed with experts at every large centre of population.

They estimate that one particular advertisement about rationing saved the Ministry all the trouble and expenses of printing and distributing no fewer than 12,000,000 explanatory leaflets.

* * *

Acid Calcium Ammonium Phosphate

Acid calcium ammonium phosphate is a product which can be used as a substitute for cream of tartar. It is a calcium ammonium double salt (sesquihydrate) which undergoes a characteristic reaction at the temperature of baking. It reacts with any excess of sodium bicarbonate by splitting off ammonia, which, in turn, reacts with sodium bicarbonate, releasing a further quantity of available carbon dioxide.

Acid calcium ammonium phosphate is at the moment mainly used in the baking powder and self-raising flour industry. When incorporated in mixes in moderate quantities—*i.e.*, up to 5 per cent. of the finished food product—the smell of ammonia released is hardly noticeable, and it has therefore become very popular for incorporation in self-raising flour.

Among the other industrial uses of this interesting product is its use as an acid ingredient in tableting, as the acid compound in various carbon dioxide forming mixtures, and many other uses. It is manufactured and marketed by the Watford Chemical Co., Ltd.

OBITER DICTA

It is no use talking to the British public about scientific food.—*Lord Woolton.*

* * *

I do not want to cut the tea ration if I can help it, but look at the map.—*Lord Woolton.*

* * *

Attention should be called to the waste of valuable foodstuffs by persons feeding wild pigeons.—*Kensington Public Health Committee.*

* * *

What most people eat is what they can afford. They like what they eat to be tasty. But what is tasty to one man is revolting to another.—*"Hal o' the Wynd" in the Glasgow Evening Times.*

* * *

It is very humiliating for me when I have to refuse customers, and they must have some peculiar thoughts about me.—*Southwark grocer, applying to the Food Committee for permission to change his wholesaler for sugar.*

* * *

A body of tasters at the Ministry of Food taste everything that is sent in. To get varied reactions, these form a cross-section of opinion, men and women, clerical staff and active workers; even builders and firewatchers are called in.—*The Observer.*

* * *

The public, at the moment, are submitting many hedgerow products. Queer plants are sent on by the Ministry to the Royal Horticultural Society for an opinion. One old man of 80 sent in finely sliced artichoke chips, which won complete approval.—*The Observer.*

* * *

I never read a new edict of Lord Woolton's about tinned food without longing to write to him and beseech him not to use the word "canned". Canned is good American but tinned is better English. Perhaps if he realised how much less appetising food sounds to some of us when it is "canned" instead of being tinned he would return to normal English.—*Robert Lynd, in John O'London's Weekly.*

* * *

Mint freshly picked and infused as tea is widely popular. Will our foreign friends teach us the processes of treatment and the uses of blackberry, violet and mallow leaves and cherry stalks, etc.? When these channels have been fully explored, it is to be hoped that our teachers of food production will make these excellent and health-giving beverages widely known. —*G. Clear in a letter to The Times.*

Change of Address

The new address of Corn Products Company, Ltd., is Ingersoll House, 9, Kingsway, W.C. 2.

* * *

Dehydration in South Africa

A large dehydrating plant, capable of handling vast quantities of fruit and vegetables, is planned for South Africa.

* * *

Compressed Sugar

A Cuban expert, Dr. Ramirez, has perfected a method of compressing sugar into tabloid form. His formula is being sent to the Allied Governments. Ramirez claims that one tabloid the size of a pea is equivalent to about one tablespoonful of ordinary sugar and will save much shipping space.

* * *

Meat Traders' New Company

Seventy-five Smithfield Market firms have formed a public company — Smithfield Fresh Meat Traders' Association, Ltd.—with the object of enabling the trade to deal efficiently and economically with any planned system of food distribution.

Before the war these firms handled between them 100,000 to 115,000 tons of home-produced meat annually, representing a market turnover of £12 to £15 millions.

* * *

Sterility of Canned Foods

After seventeen years of constant advocacy there should exist no doubt as to the opinion of FOOD MANUFACTURE with regard to the integrity of canned foods, but it has been pointed out that the caption of a paragraph in the July issue, reporting the Ministry of Food's recommendation that canned foods should not be used for window dressing in hot weather as it is likely to be spoiled if left in the sun, might be interpreted as casting doubt on the sterility of the products. Such, of course, was farthest from our intention. Rather it was felt that in the recommendation made it might have been advisable to point out for the benefit of the layman that there was no question of any danger of development of micro-organisms in the cans, but that it was a matter of storage life and quality.

COMPANIES

British Oil and Cake Mills, Ltd.

The oil seed crushing and oil cake manufacturing part of the Lever-Unilever organisation—British Oil and Cake Mills, Ltd.—has continued to work under the Ministry of Food, and during the past year the trading profit amounted to £756,175 after providing for depreciation. This compares with £858,703 shown in the previous account, and after debiting war damage contributions and taxation the balance of net profit worked out at £578,296 as compared with £720,373 in 1940. The controlling company receives a dividend of 5 per cent. on the ordinary capital, and is responsible for E.P.T., the final figures being made up in the manner indicated below:

	£
Brought forward from 1940	77,054
Net profit—year ended December, 1941 ...	578,296
Disposable balance	£655,350

	£
5½ per cent. Preference dividend	40,870
12½ per cent. Preferred dividend	363,628
5 per cent. Ordinary dividend	175,000
Carried forward to 1942	75,852
	£655,350

Current assets are shown on the balance sheet at £3,015,446, while current liabilities total only £675,266.

* * *

Saml. Hanson and Son, Ltd.

Provision merchants who deal in canned goods are dependent on supplies and profit margins allowed by the Ministry of Food, and in the case of Saml. Hanson and Son, Ltd., the trading profit in 1941 amounted to £66,643 as compared with £111,247 during the preceding twelve months. Owing to a reduction in the taxation charge, however, the net profit was only £11,767 less than the 1940 figure, and the dividend on the Preferred shares is being maintained at the rate of 10 per cent. for the third consecutive year, and the carry forward increased by £466. The following is a summary of the final appropriation figures:

	£
Brought forward from 1940	9,112
Net profit—year ended December, 1941 ...	12,599
Disposable balance	£21,711

	£
5½ per cent. Preference dividend	7,133
10 per cent. Preferred dividend	5,000
Carried forward to 1942	9,578
	£21,711

At the close of the year the value of the stocks had risen from £621,009 to £709,595, and while creditors and contingencies, etc., amounted to £719,430, the current assets totalled £1,002,844.

* * *

Geo. Bassett and Co., Ltd.

During the financial year to the end of March last, a trading profit of £75,149 was made by Geo. Bassett and Co., Ltd., confectionery manufacturers, etc., and after debiting taxation the net profit proved to be £31,053. This figure compares with £30,208 shown in the previous account, and the declaration of a final dividend of 15 per cent. brings the total distribution for the year up to 20 per cent., as before. This leaves a credit balance of £14,315 to be carried forward to the next account, as against £12,012 brought in.

* * *

Metal Closures, Ltd.

The manufacture of seals and metal closures for bottles and containers has been satisfactory, and, generally speaking, dividends are being maintained. In 1941, for example, Metal Closures, Ltd., made a trading profit of £37,267, this being arrived at after charging depreciation, and representing an increase of £1,945 over the previous year's figure. Provision for taxation, however, was necessary on a larger scale, and with an additional charge for war damage insurance the net profit worked out at £12,224 as compared with £15,472 previously. The company's capital of £100,000 is in the form of Ordinary shares of 4s., and the dividend of 12½ per cent., less tax, absorbs £6,250.

* * *

Virol, Ltd.

Virol, Ltd., has declared a first and final dividend on Ordinary of 10 per cent. (the same) for the year to March 31. Net profit announced as £14,783, against £15,857.

* * *

Tate and Lyle

The directors of Tate and Lyle have declared an interim dividend at the rate of 3½ per cent., subject to tax (the same), in respect of the year ending September 30, 1942. In each of the three preceding years a total of 13½ per cent. has been paid on the £7,000,000 Ordinary.

* * *

Liebig's Interim

Liebig's Extract of Meat Company is maintaining interim Ordinary dividend at 2 per cent., tax free. The final payment last year was 6 per cent., tax free, on the £2,000,000 Ordinary capital. Stockholdings in Bearer form—both Preference and Ordinary—are convertible to Registered form without expense to the holder.

* * *

Tax £632,654—Net Profit £58,496

Crosse and Blackwell, manufacturers of all kinds of food products, is raising the dividend on the Ordinary for 1941 to 4 per cent., as against 2½ per cent. for the previous year. This is the highest distribution since the capital reduction in 1936.

After providing £632,654, or £307,685 more than last time, for taxes, and £11,104 (against nil) for war damage contribution the net profit is stated as £58,496 (£87,699).

The paid up Ordinary capital is £995,583.

Information and Advice

Gelatine from Cattle

7,947. *Can you give us any suggestion regardng a substitute for gelatine used in the packing of meat galantines, or a formula for the manufacture of gelatine, giving details of material, plant and equipment required?* (Belfast.)

As matters stand at the present moment, there is really nothing that can be suggested to replace gelatine in meat galantines. Agar agar appears to be unobtainable. The manufacture of gelatine is a highly technical business and does not come within the scope of this service, but as you have the raw material available, we think that perhaps your purpose would be achieved by treating fresh bones in a digester under a pressure of 30 lbs. for two hours. In this way you will obtain a fairly strong solution of "gelatine", which should be suitable for meat packs. If it is not strong enough, the liquor can be very rapidly evaporated in a steam-jacketed pan.

This material can be stored in tins and will keep for a long time. It will solidify and can be re-melted for use.

There are various alternatives, but the manufacture of actual gelatine is so complicated that we should not advise attempting it without the advice of an expert, especially as apparently there is, in your case, no necessity for finishing it to the usual form.

Piping-Jelly

7,997. *Can you suggest an alternative to the use of agar agar in the manufacture of piping-jelly? We believe a satisfactory piping-jelly can be made with gum tragacanth. Is this so?*

We should be most thankful if you can suggest an alternative jellying agent (at present obtainable), also furnish recipe or suggestions as to its use for the above purpose. (Glasgow.)

A typical formula is as follows:

Gum tragacanth	2 lb.
Water	4 gal.
Glucose (40)	40 lb.
Tartaric acid in 1 oz. of hot water ...	½ oz.
Essence and colour	*Quant. suff.*

Soak the gum in 2 gals. of the water for twenty-four hours. Stir up well and add the other 2 gals. of water and allow to stand for another twenty-four hours. Dissolve the acid in the ounce of hot water. Rub the gum through a fine hair sieve into a steam-pan. Place the glucose in another steam-pan and gently bring to about 180° F. and shut off the steam. The gum is next brought to the boil, and should be stirred all the time. Add the hot glucose, stir well, and bring to about 218° F. Rub all through a fine hair sieve. Add the flavouring, allow to cool, fill and place a paper disc that has been dipped in glycerine on the top of each tin. A pint of glycerine can be added to piping-jelly when boiling, which will assist in preventing mould growth.

We understand that whole gum is best, and the medium quality makes quite a good product, although naturally the best quality produces a better product.

Obviously some of the ingredients mentioned above are either restricted or unobtainable at the present time, but we pass on the formula as a basis for experiment.

Information Supplied

7,956. *Would you please oblige us with the names and addresses of manufacturers or suppliers of sodium glutamate?* (Herts.)

7,976. *I am taking advantage of your advice column to ask for a recipe and instructions for the manufacture of grapefruit marmalade, manufactured from pulp as supplied by the Ministry of Food and conforming with the Regulations now in force.* (Derby.)

7,979. *We would be obliged if you gave us, through* FOOD MANUFACTURE, *a formula for making baking powder or an efficient substitute.* (London.)

7,980. *We shall be pleased if you will give us the names and addresses of manufacturers or factors of moisture-proof paper, suitable for wrapping steamed sponge puddings.* (Blackpool.)

7,984. *We are anxious to obtain a reliable directory of food manufacturers in this country for market research purposes, and wonder whether you can recommend any particular directory.* (Middlesex.)

7,987. *We should be glad if you would advise us which are the most popular—glass-lined vacuum tanks or vacuum tanks with stainless steel instead of glass. These tanks are mainly used for concentrating fruit juices, such as orange juice, lemon juice and tomato products, by extracting the water, leaving behind the solids, colour and vitamins of the fruit. We have a large number of glass-lined tanks here, but unfortunately the glass keeps chipping off, which goes into the products and is more or less detrimental to the products and somewhat dangerous.* (Victoria, Australia.)

7,991. *We have an enquiry from one of our customers concerning a Bristol patch snap vacuum tin manufactured in your country. We would appreciate very much any descriptive information that you might be able to give us concerning this so that we may in turn pass along the information to our customer. All attempts to locate this information here have proved futile.* (U.S.A.)

8,003. *We shall be grateful if you can inform us whether there is any machine available for fixing adhesive tape to the slip-on lid type of tin and, if so, the name of any supplier.* (Devon.)

8,020. *We have been troubled recently with the deterioration of our coffee extract, but whether this is due to bacteriological contamination or of contamination by spore-forming yeasts is not yet known.* (Herts.)

8,022. *We should esteem it a favour if you would be good enough to give us the names of suppliers of the following: Anchovy essence or anchovies, smoked herrings or bloaters, lobster tomali, shrimp extract.* (Smethwick.)

8034. *Could you kindly supply us with the names of firms manufacturing fruit-pulping machines?* (Staffs.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improved Apparatus for Filling Sausage Meat and other Plastic Food Substances into Cans and like Containers

This invention is concerned with the preservation of foodstuffs in cans and like receptacles and particularly with apparatus for attachment to meat presses or for attachment to presses for other plastic food substances or food preparations, the object being to enable the meat or other food substance to be packed into cans or like containers in the form of skinless sausages, a plurality of such sausages being accommodated in each can or like container and each sausage being equal in length to the depth of the can.

Although the term "sausage" is generally used to denote an article consisting principally of minced meat enclosed in a thin casing or skin, it is to be understood that the word "sausage" is used herein to define any food substance or food preparation formed into rod shape, whether circular, oval or other shape in cross-section.

The apparatus of the present invention comprises a cylindrical or other suitably shaped filler casing closed at one end except for the provision of an inlet branch for attachment to the outlet connection of a meat or like press, the portion of the casing remote from the said inlet branch containing a plurality of parallel tubular passages arranged longitudinally in the casing and dividing the interior of the casing into an inlet chamber for the sausage meat or other plastic food substance and a tube chamber containing tubes which can be charged with the meat or other food substance from the inlet chamber, the tubes being adapted to deliver the meat or other food substance in the form of skinless sausages to cans or like containers which can be fitted to the delivery end of the filler casing to receive the sausages, and associated with the filler casing is a cutter adapted to sweep across the delivery end of the casing to sever the sausages when each can or like container has been filled.

The invention results in the can or like container being filled with a plurality of skinless sausages, the spaces between which may be filled with molten lard or any other suitable liquid food preservative or seasoning. The sausages are also all of even and uniform shape and extend the full depth of the can or like container.

543,452. William Muir Yuill.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

543,271. RECORD ELECTRICAL CO., LTD., and WOODCOCK, R.: Indicating and recording instruments.

543,315. HOOVER, LTD.: Absorption refrigerating apparatus.

543,318. GENERAL ELECTRIC CO., LTD., and RYCROFT, J. L.: Electrical hotplates.

543,320. WINGFOOT CORPORATION: Container.

543,326. SIMPSON, L. E.: Cleaners for sifting screens.

543,364. WILLIAMS, V. G., GRANGE, E. R., and DELAMERE, R. D.: Packaging machine.

543,372. LOWE CORPORATION, J.: Extrusion machines.

543,377. ELECTROLUX, LTD.: Absorption refrigerating systems.

543,427. CULPITT, G. J., and CULPITT AND SON, LTD., G. T.: Cake decorations.

543,452. YUILL, W. M.: Apparatus for filling sausage meat and other plastic food substances into cans and like containers.

543,508. SHARPLES CORPORATION: Centrifugal separators.

543,531. CROCKATT AND SONS, LTD., W., and CROCKATT, W. C.: Electric contact thermometers and the like.

543,582. TRIGGS, W. W. (STEIN HALL MANUFACTURING CO.): Preserving foodstuffs, beverages and other substances susceptible to rope and/or mould.

543,624. HALLIDAY, M. C.: Apparatus for heating liquids.

543,675. WHELDON, M. M.: Apparatus for and method of feeding pulverulent and granulated materials.

543,680. BELLAMY, A. J.: Egg product.

543,874. MERCER, C. H.: Supports for articles to be warmed or heated.

544,062. WIGGINS, J. H.: Containers for storing liquids. (Divided out of 543,884.)

544,426. FISADCO, LTD., and HASLAM, W. H.: Machines for washing vegetables and the like.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

LATCATEE.—617,042. Tea. **Charles William Kent,** trading as **Charles Kent Products,** Hellifield, Hallam Street, Guiseley, near Leeds; Manufacturing Confectioner.

CLOTH OF GOLD.—617,044. Sweets. **Charles William Kent,** trading as **Charles Kent Products,** Hellifield, Hallam Street, Guiseley, near Leeds; Manufacturing Confectioner.

MALLATEX.—617,079. Marshmallow sold in bulk. **The Scottish Flavour and Colour Co., Ltd.,** Mayfield Works, 27 to 29, Ratcliffe Terrace, Edinburgh; Manufacturers and Merchants. (By Consent.)

BEV.—617,706. Coffee essence and coffee and chicory essence. **J. Lyons and Co., Ltd.,** Cadby Hall, Hammersmith Road, Kensington, London, W. 14; Caterers and Purveyors. (By Consent.)

New Companies

Jenner Foods, Limited. (371692.) 290, Stockport Road, Manchester. To take over the bus. of food production specialists cd. on at Chorlton-on-Medlock by J. R. Sorenson and W. L. Goodfellow. £1,000. Dirs.: J. R. Sorenson, Old Hall Farm, Rainow, Ches.; W. L. Goodfellow, 8, Barcheston Road, Cheadle, Ches.

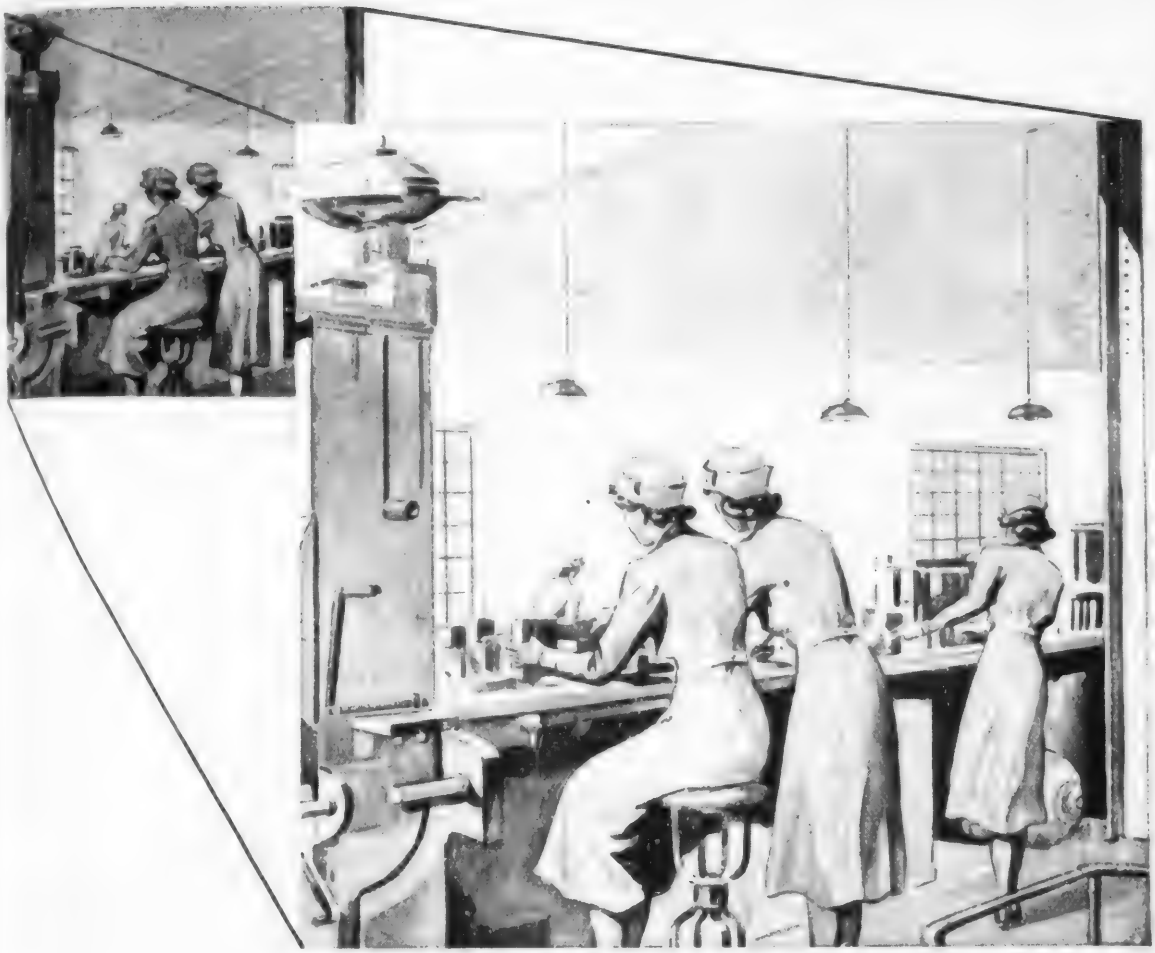
W. B. C. (Packings), Limited. (371703.) To carry on bus. of mnfrs. of and dlrs. in boxes, cartons, bags, cases, wrappings, etc. £3,000. Permt. gov. dir.: E. S. Gibbons. Subs.: H. S. Gibbons, 2, Woodborough Road, Putney, S.W. 15; Mrs. M. A. Hayter, 10, Waldegrave Road, Ealing, W. 5.

Armsons, Limited. (371708.) 195, Rochdale Road, Bury, Lancs. To carry on bus. of bakers, confectioners, etc. £1,000. Dir.: J. Jopson, 20, Bolton Street, Bury, Lancs.

Charles Morris, Limited. (371714.) 45, Chancery Lane, W.C. 2. To carry on bus. of wholesale and retail confectioners, tobacconists, etc. £1,000. Dirs.: C. Morris, 43, Downs Park Road, E. 8; Betty R. Morris, 43, Downs Park Road, E. 8.

Fish Products (Grimsby), Limited. (371718.) £500. Dirs.: A. E. Kelham, "Glyn Garth", Scartho Road, Grimsby; F. Thomson, address not stated; B. S. Bellamy, 2, Fords Avenue, Healing.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.



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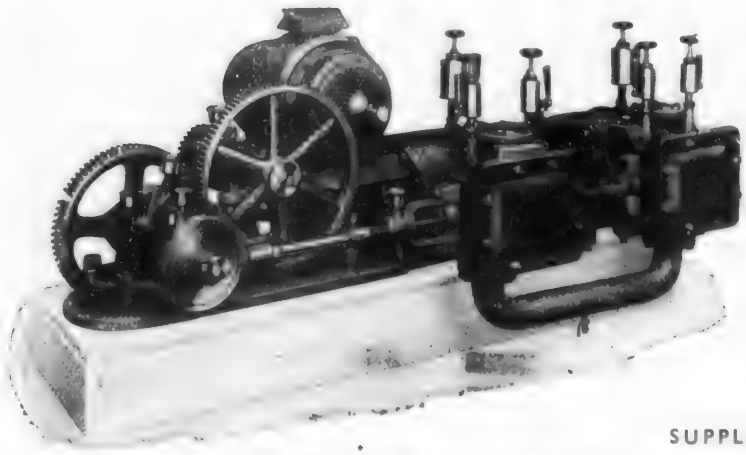

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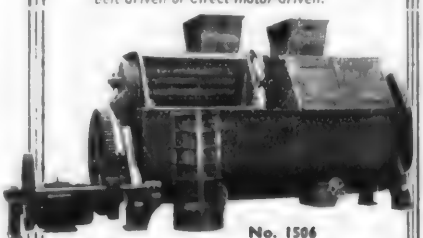

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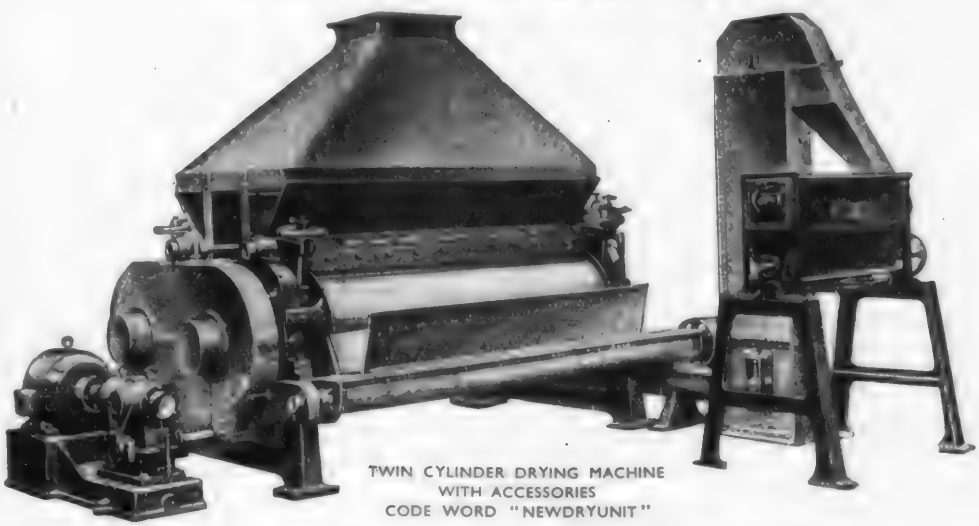

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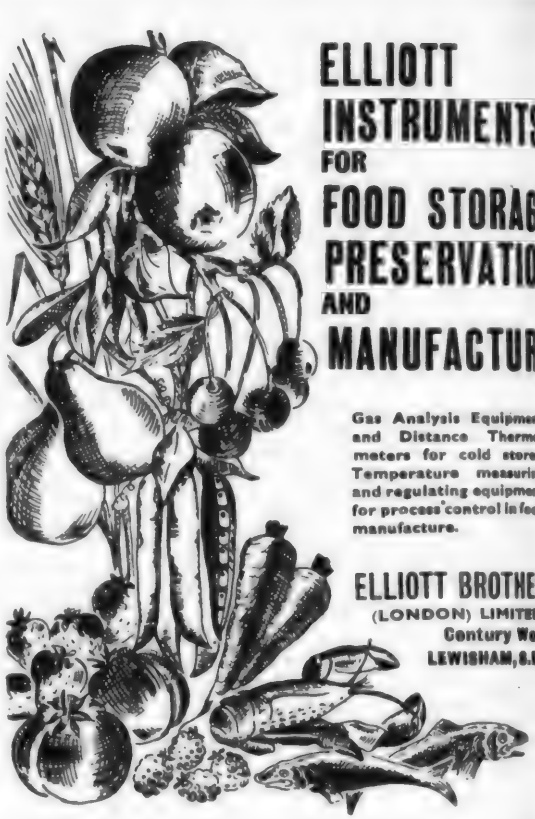

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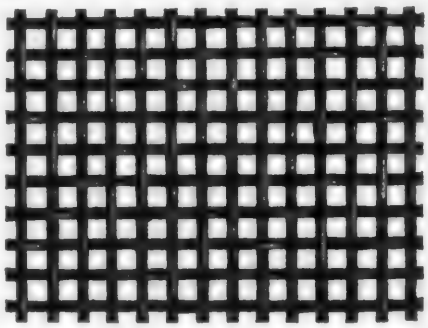

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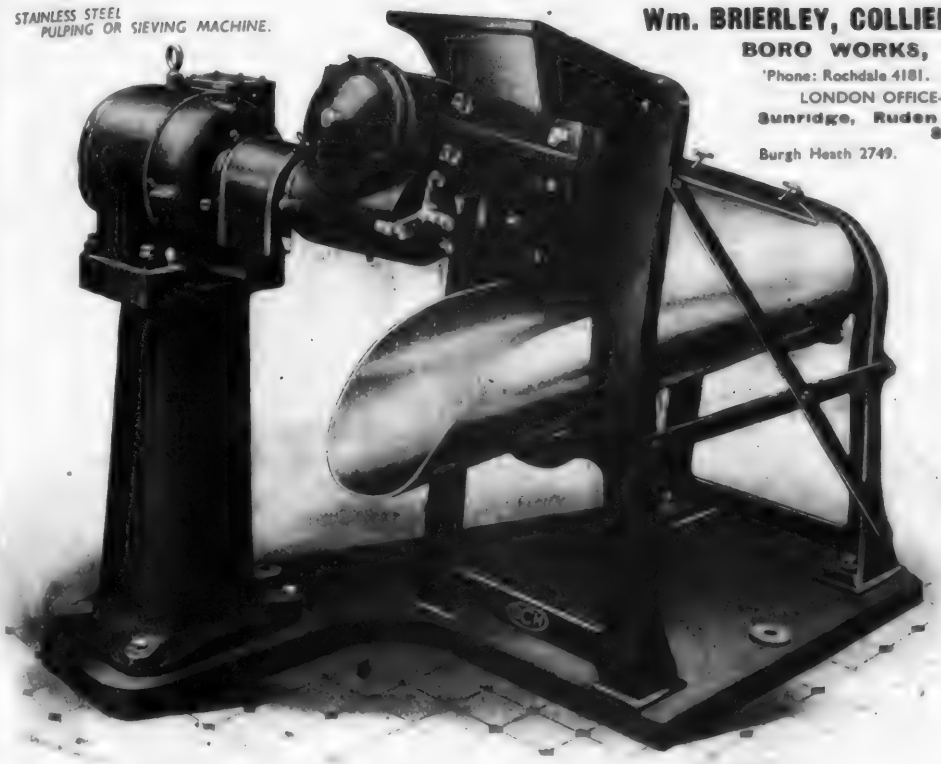

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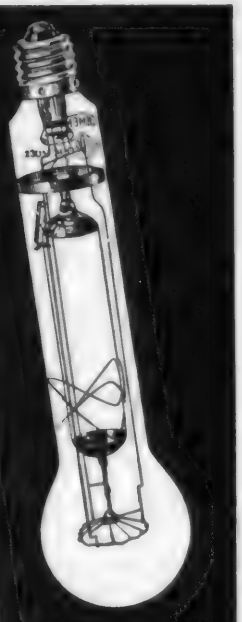

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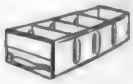

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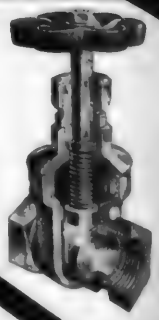

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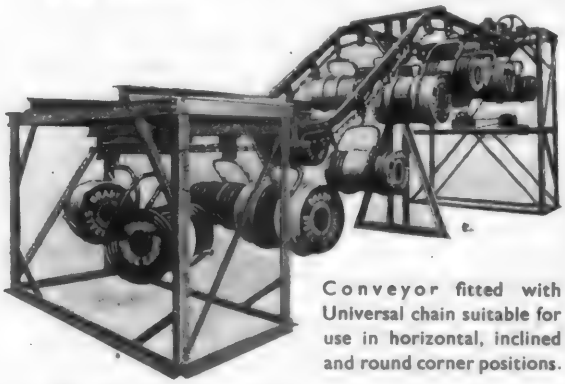

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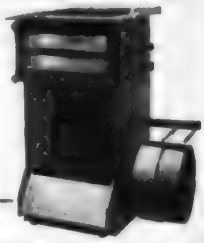

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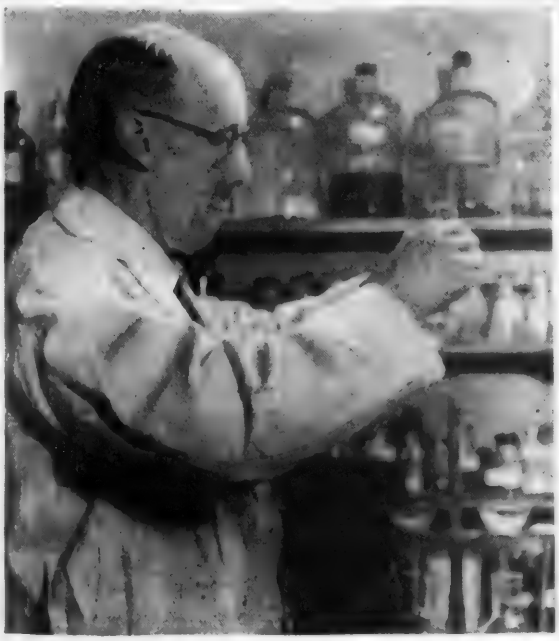

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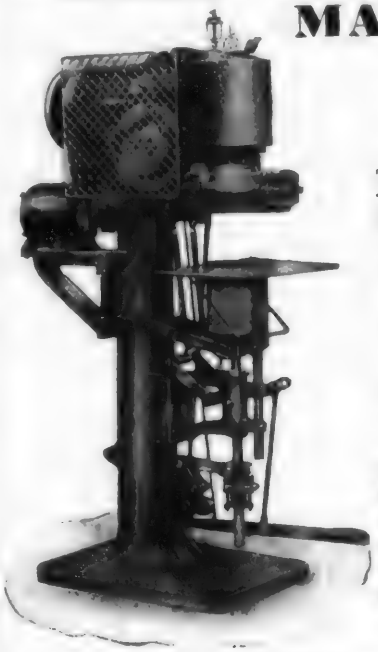

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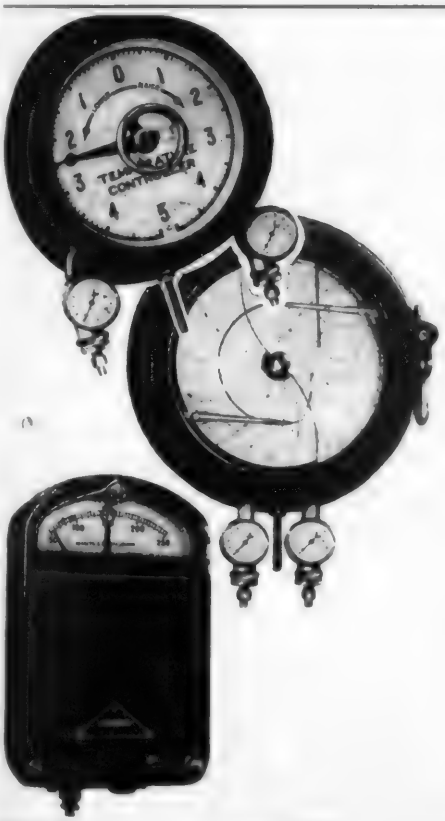

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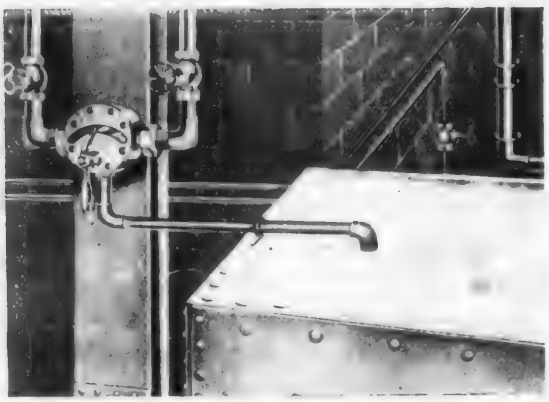

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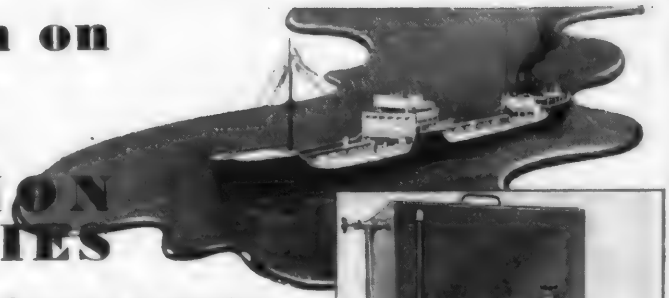

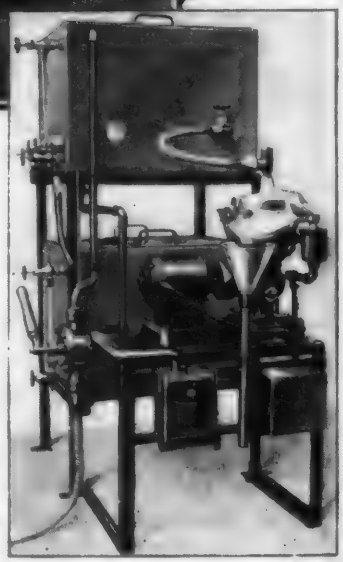

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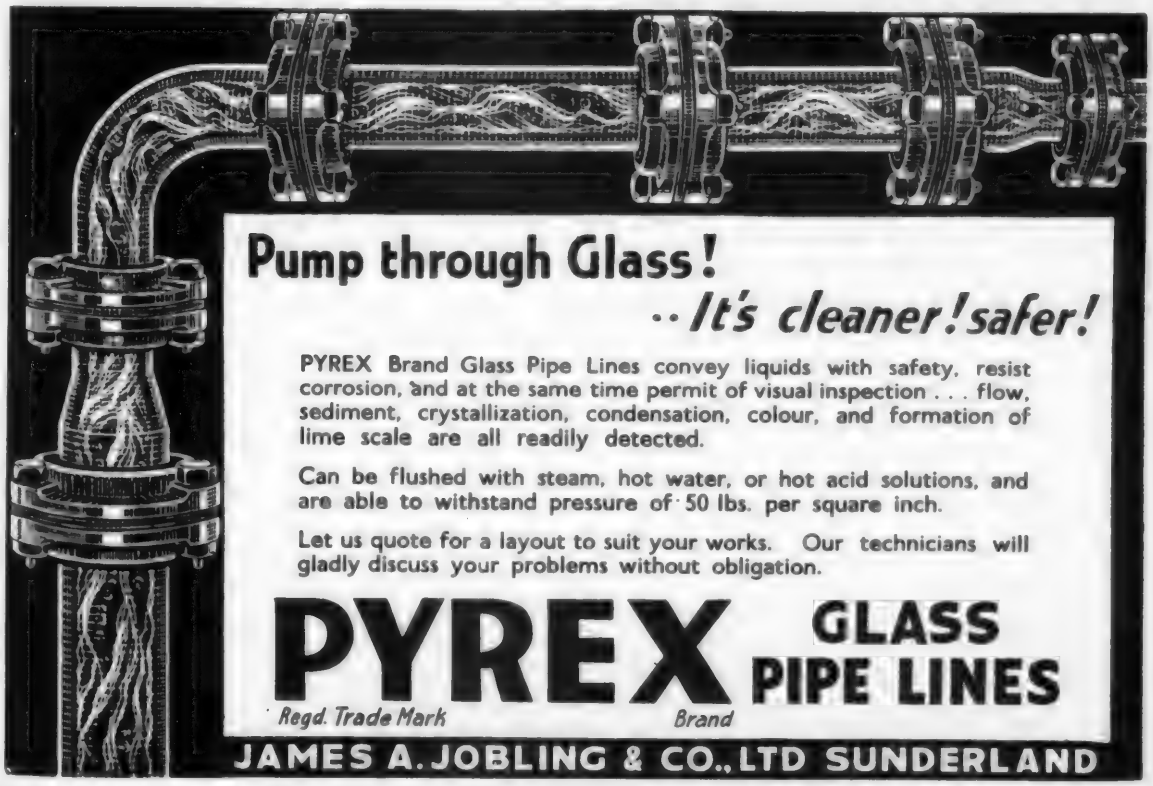

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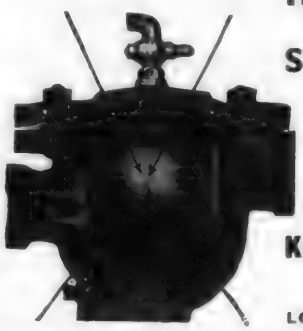

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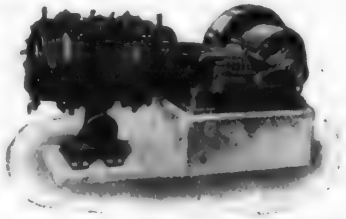

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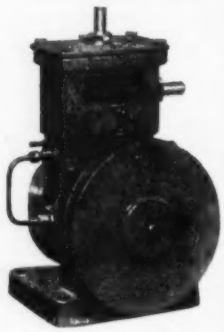

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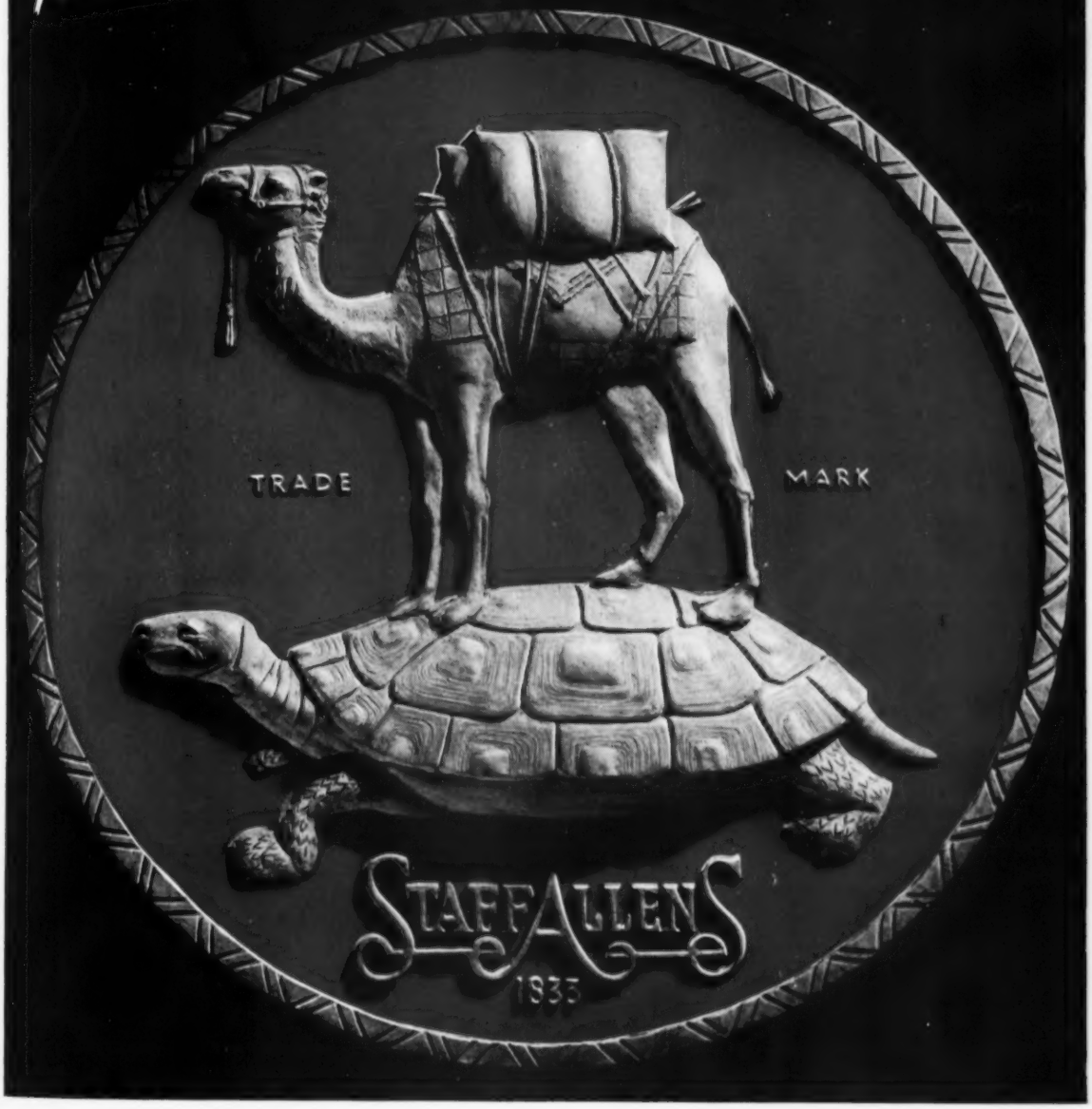

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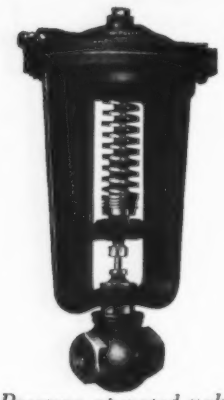

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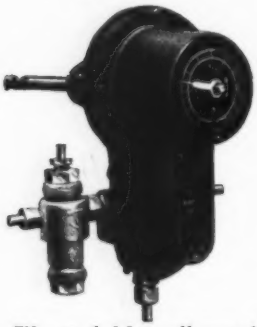

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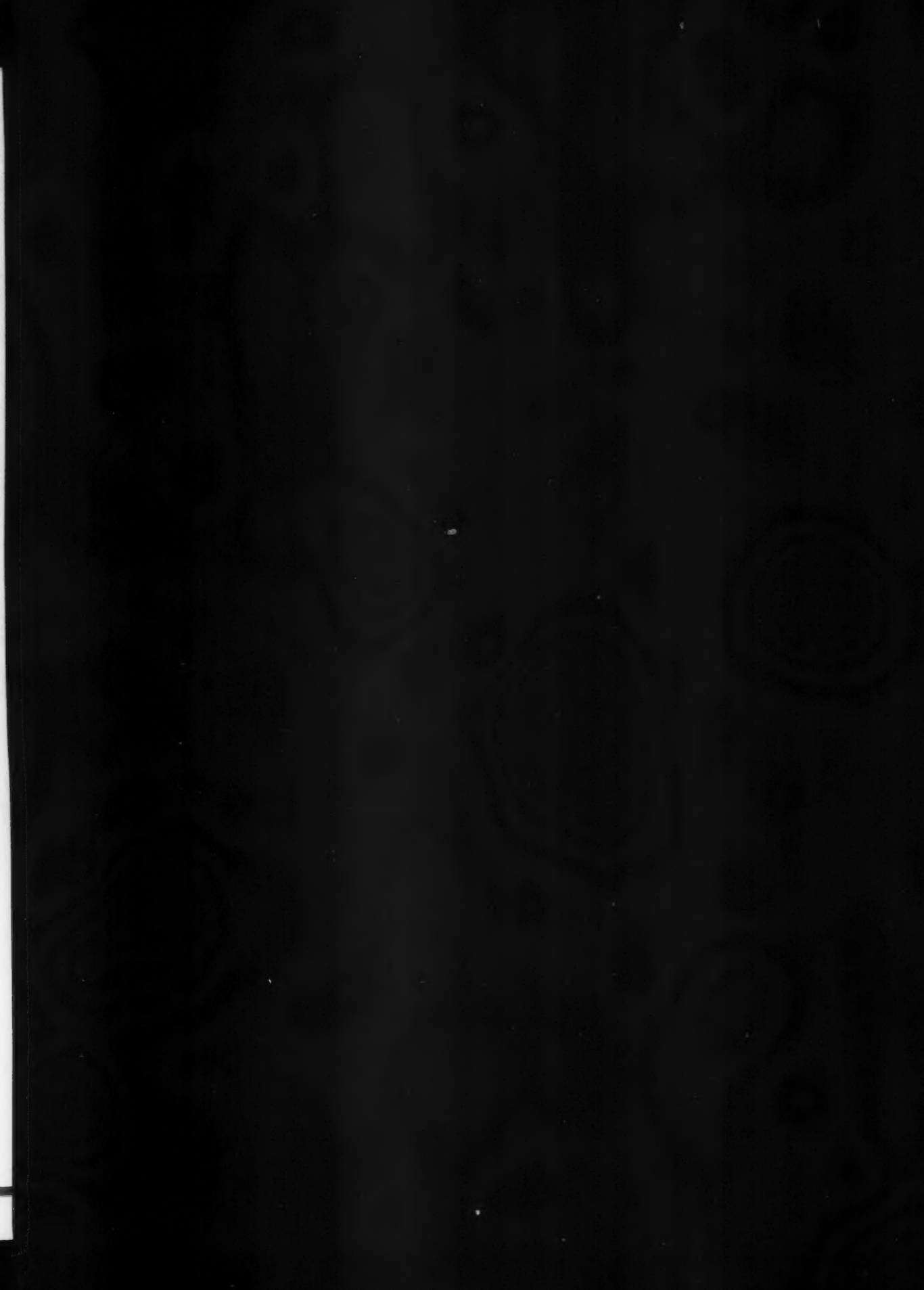
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